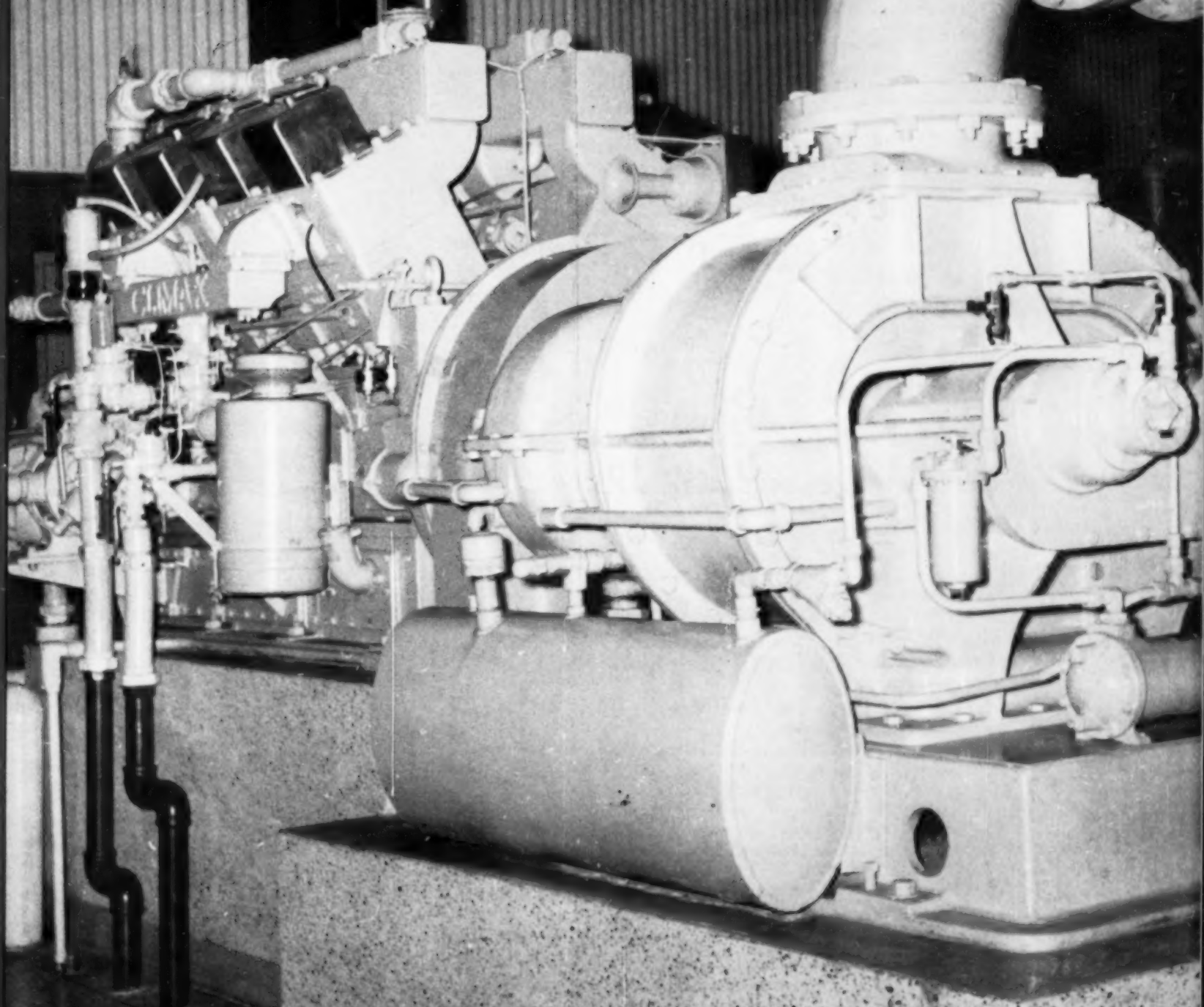


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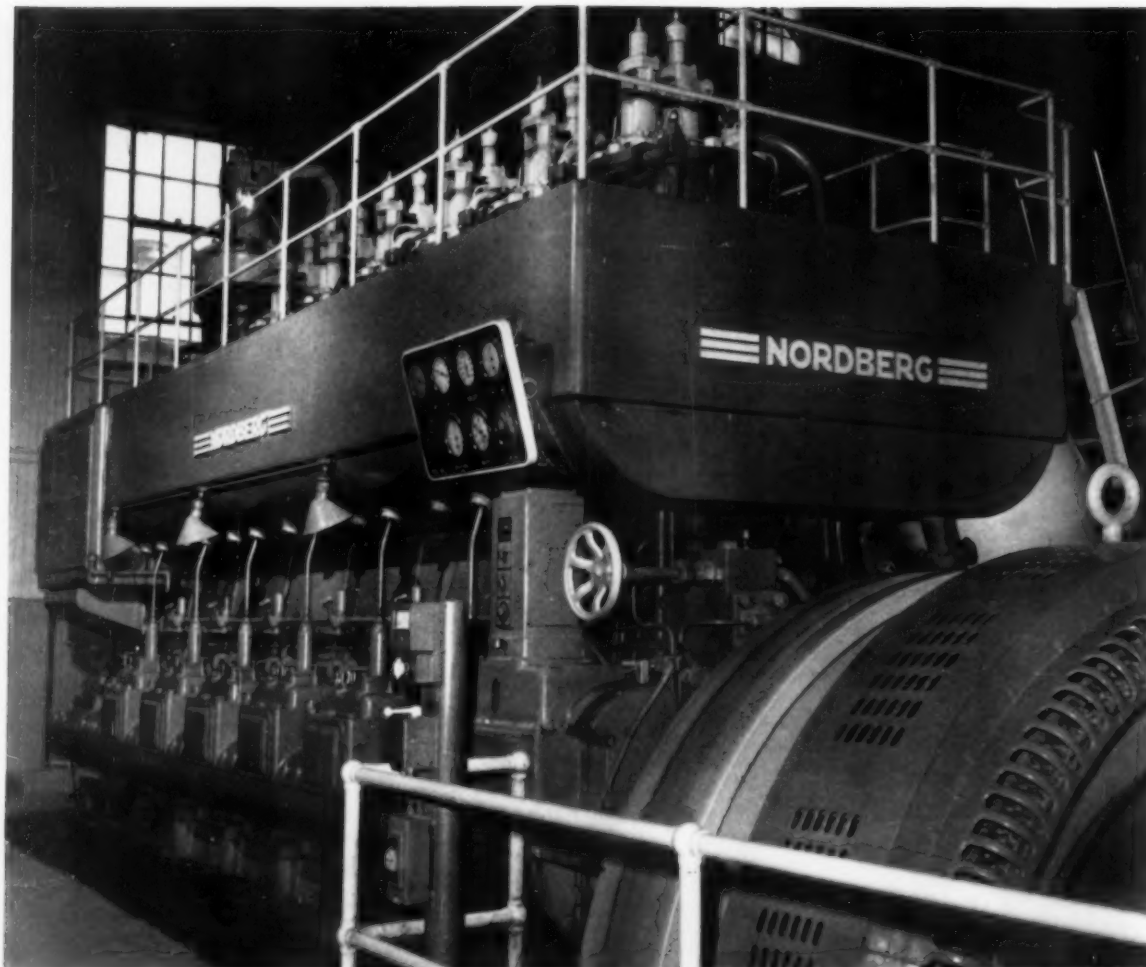
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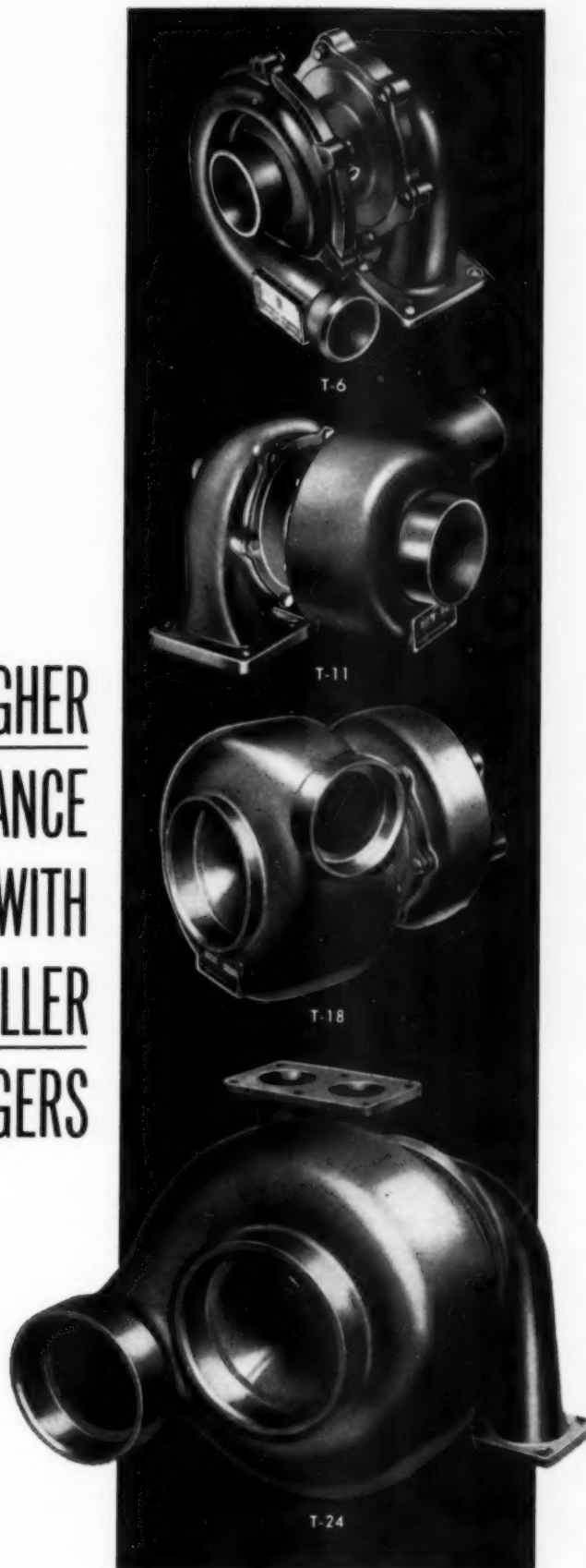
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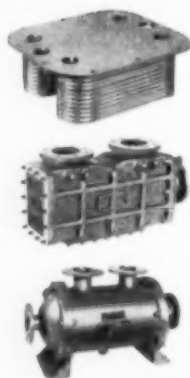


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# DIESEL AND GAS ENGINE PROGRESS

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### FRONT COVER ILLUSTRATION

One of two Climax V-80 gas engines installed in the Pleasant Hills Sewage Treatment Plant near Pittsburgh. Engine drives a Roots-Connors-Mower. See Page 17 for a story on the plant.

## SHOVEL BY BUCYRUS-ERIE / CATERPILLAR ENGINE POWER



Second of a series

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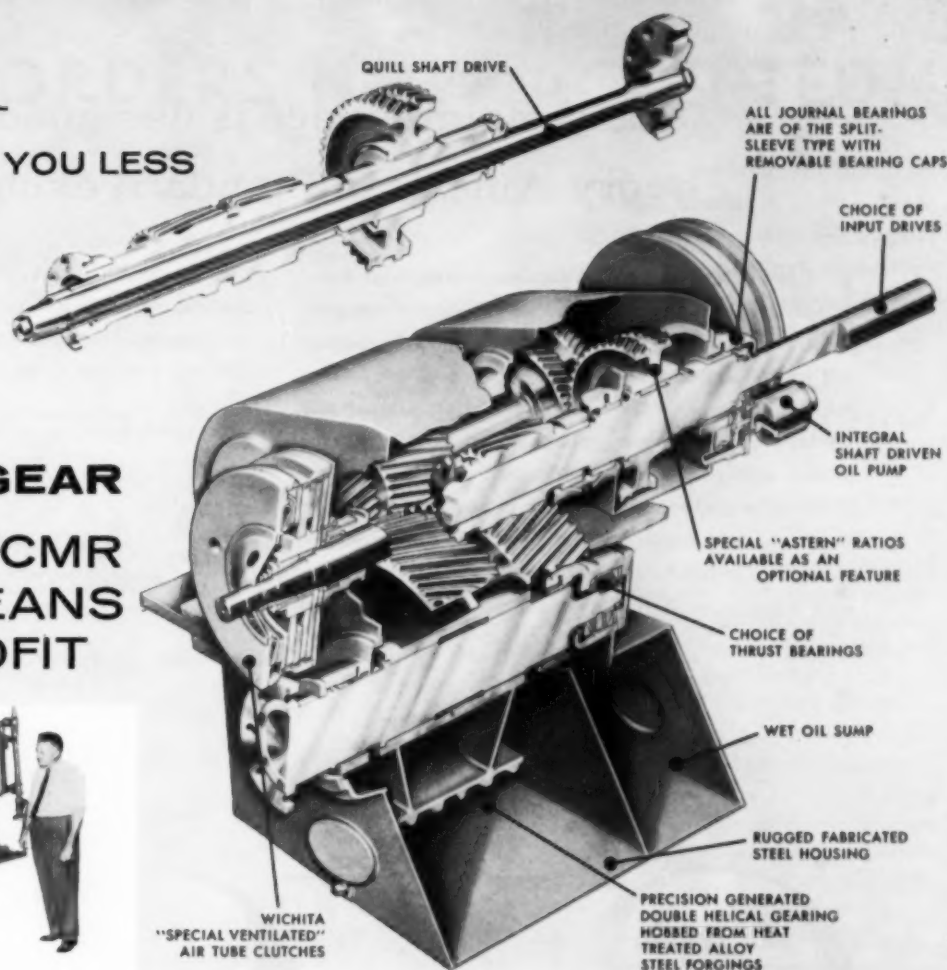
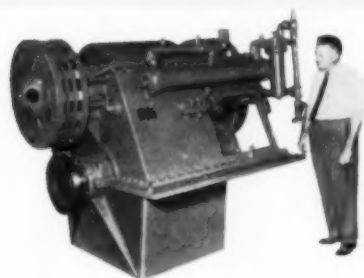
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**LOWER INSTALLATION COST.** The exclusive PCMR design permits installation without costly sub bases, stub shafts, extra pillow block bearings. Positive housing alignment is assured through Western Gear's exclusive three-point suspension during installation. Independent clutch mounting, another Western Gear exclusive feature, eliminates stub shafts and pillow blocks, minimizes engine gear alignment problems. Exclusive quill shaft drive or standard drive permits easy torsional tuning often eliminating torsional problems without the use of expensive special flexible couplings.

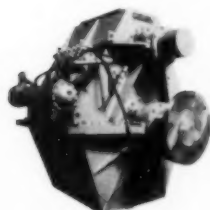
**LOWER OPERATING COST.** High efficiency precision manufacture guarantees low power loss through PCMR. Factory tests show maximum losses within 1% per cent making more horsepower available at the propellor. Conservative design and

service factor protection assures long life.

**LOWER MAINTENANCE COST.** Exclusive outside clutch location simplifies clutch servicing, guarantees maximum air flow for good cooling. Positive clutch alignment by independent support on gear unit instead of between gear and engine reduces both spline and plate wear and eliminates possible damage to gear or engine due to misalignment. Exclusive use of split-sleeve type journal bearings — renowned for long life and high efficiency — with removable bearing caps permits easy inspection or repair of bearings. Mounting in ship on extension of lower housing split line flanges permits complete disassembly without disturbing machinery alignment.

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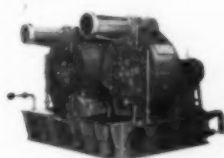
Other *Sea-Master* Marine Propulsion Gears



Straight reduction gear  
 Type MGV;



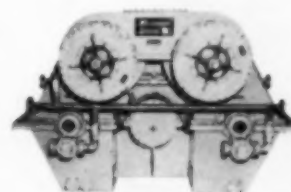
Hydraulic reverse &  
 reduction gear;



Turbine propulsion gear;



Vee-Drive;



Multiple pinion PCMR.



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or gas turbines—Here is important  
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APRIL 1960

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- 2. TURBOCHARGERS and SUPERCHARGERS**—This section of manufacture is detailed and fully illustrated to give complete information on this increasingly important phase of the industry.
- 3. TRANSMISSIONS**—The latest information on torque converters, fluid drives, and other modern means of transmitting power are fully described and illustrated in this section.
- 4. ACCESSORY EQUIPMENT**—Recent developments in fuel injection systems, governors, and other key accessory units are detailed and illustrated fully in this section.
- 5. ADVERTISING**—Leading manufacturers of engines, accessories, and services bring out the important features of their products in attractive, easy to read advertisements to further enhance the reference value of the CATALOG.
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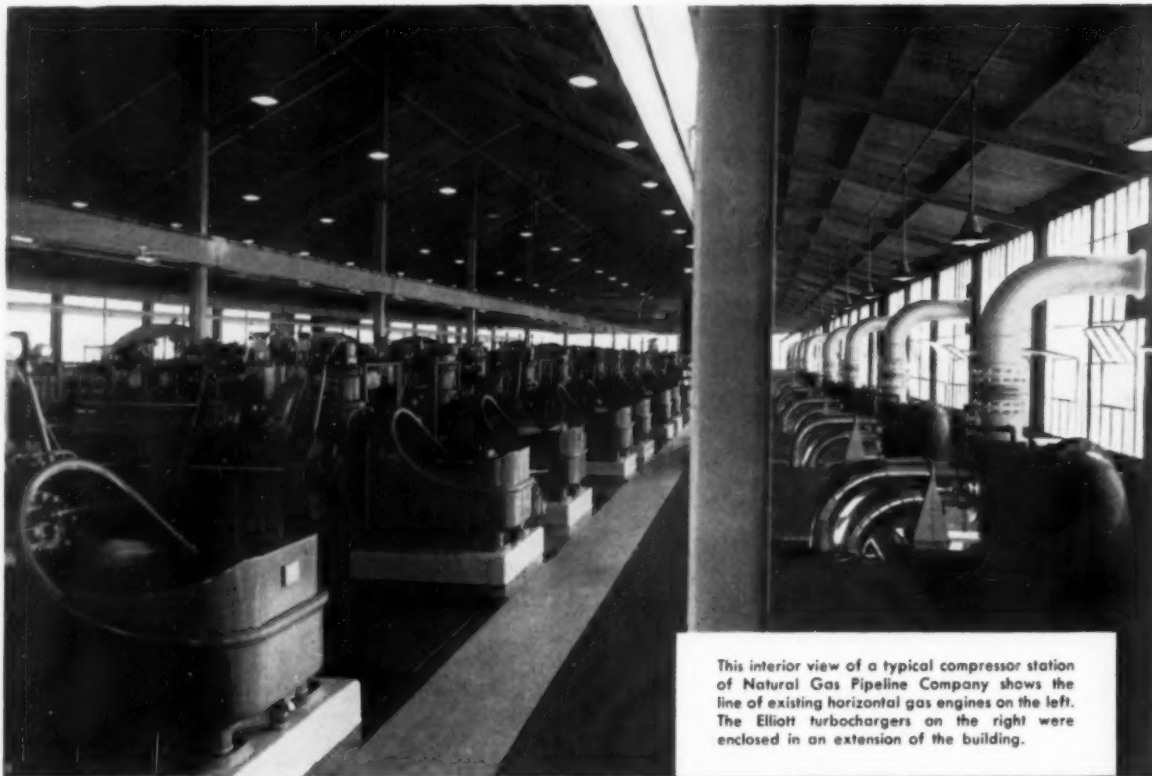
CITY \_\_\_\_\_

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# ELLIOTT TURBOCHARGERS

help increase pipeline pumping capacity **40%**



This interior view of a typical compressor station of Natural Gas Pipeline Company shows the line of existing horizontal gas engines on the left. The Elliott turbochargers on the right were enclosed in an extension of the building.

Natural Gas Pipeline Company of America was faced with the problem of increasing throughput capacity of existing pipelines. The economical solution of the problem included the application of Elliott turbochargers to 72 existing horizontal engines in nine compressor stations along the line from Texas to Illinois.

Engines originally designed to develop 1250 hp are producing 1800 hp when turbocharged. Benefits, in addition to more than 40 per cent power increase, include lower fuel consumption per horsepower and savings in operating and maintenance costs.

**ELLIOTT Company**

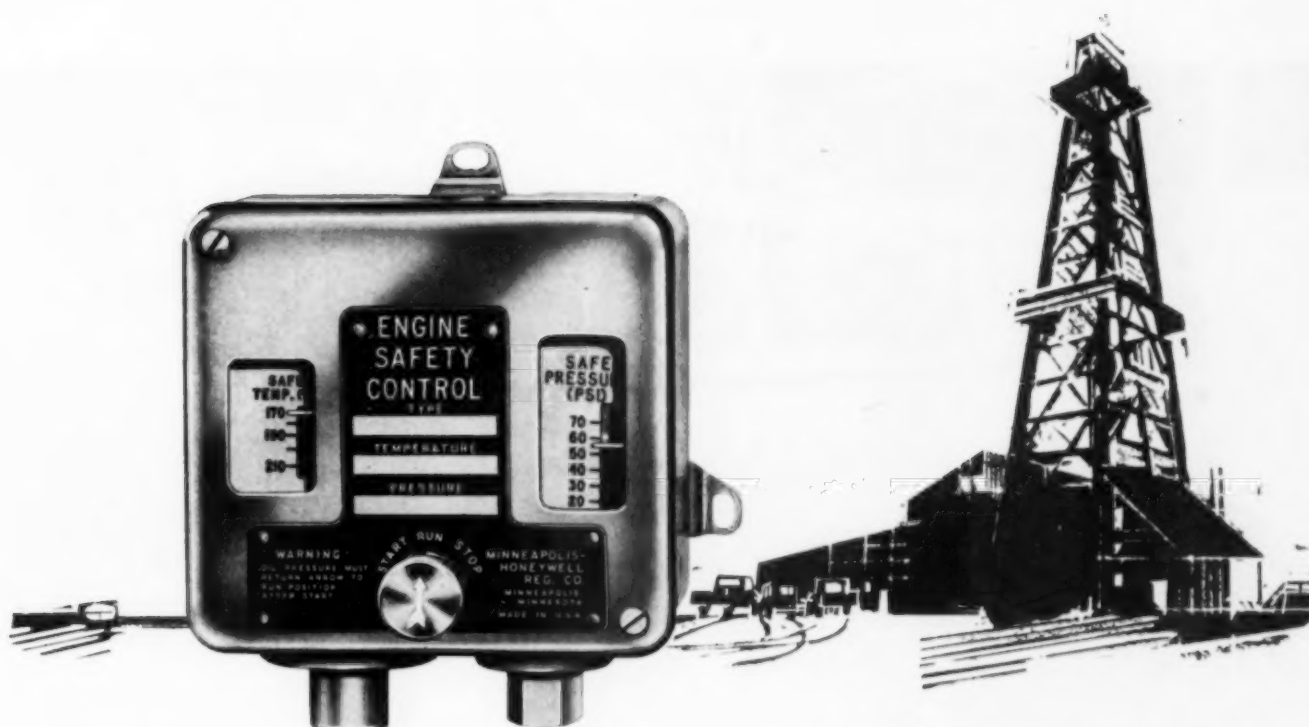
Turbocharger Department  
Jeannette, Pa.



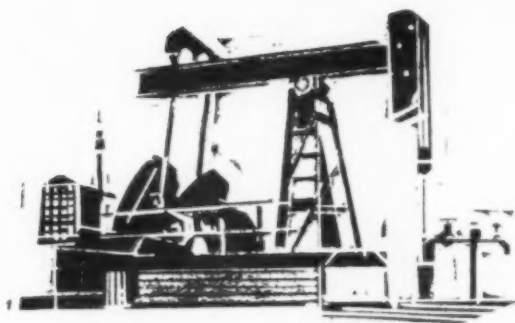
No other turbocharger manufacturer has as much experience covering the whole field of turbocharged engines as has Elliott Company.

M9-1





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Protect your investment with Honeywell's fail-safe controller ... especially vital for unattended engines. Why risk severely damaging *even one* engine because of over-heating or loss of oil pressure? By installing Honeywell's combination engine safety control, you'll help put a stop to costly repair bills and downtime. It's better than having an operator there to stop an engine or sound an alarm when trouble starts.

Honeywell's P618 engine safety control will never fail you. Temperature and pressure settings won't drift off set points because this is an *industrial* instrument for *industrial* applications with heavy-duty construction that is vibration-resistant. The patented fail-safe feature always assures a shutdown even if the bulb or capillary is damaged. Large "picture" windows and calibrated dial keep settings easily visible without removing cover. New and different, there's nothing like it!

For complete information, contact your local Honeywell office or write: Minneapolis-Honeywell, Dept. DP-4-21, Minneapolis 8, Minn.

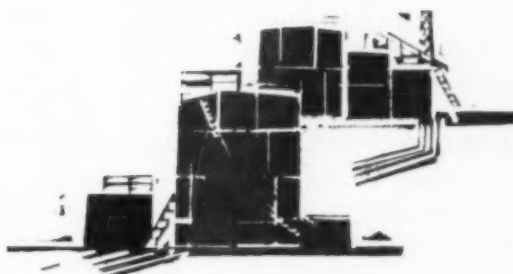
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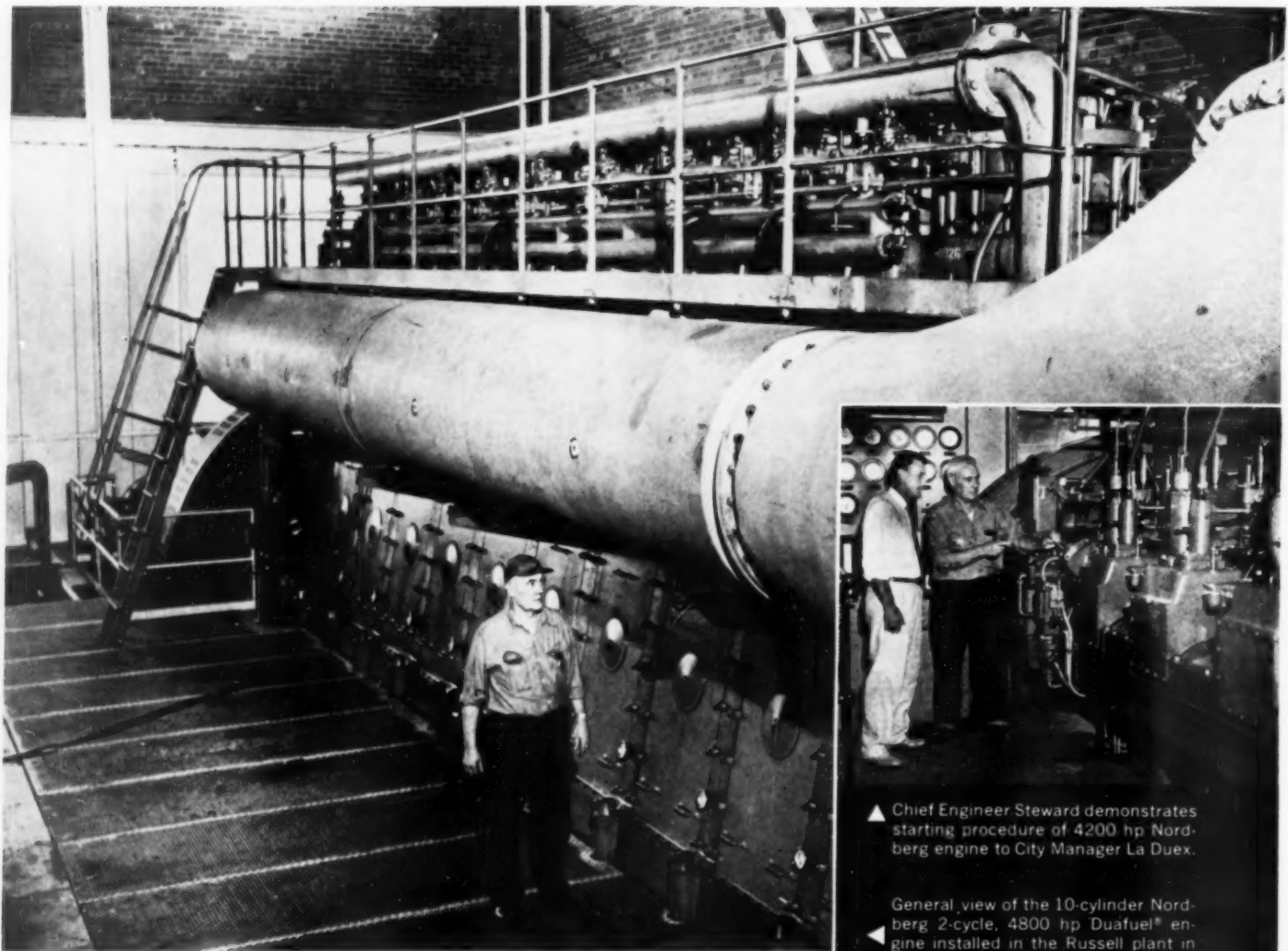


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### **Municipal Power Plant Pays Cash For 4200 HP Engine from Savings Made on 4800 HP Unit Installed in 1955**

City Manager John La Duex, Chief Engineer Dewey Steward, and the entire City of Russell, Kansas can be justifiably proud of their municipal power plant. It is the largest municipal diesel plant in Kansas, and in fact, the largest engine generating plant in the state.

This municipally owned and operated diesel power plant began operation in 1910, in the early years of the town's development. Steady progress and growth have characterized the efficient operation of this plant to handle its ever increasing demand for electrical power.

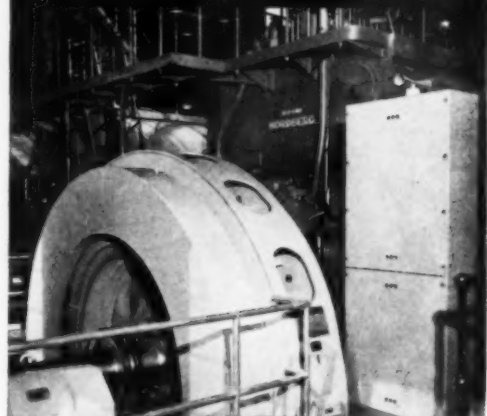
Two large Nordberg Duafuel® engines—a 4800 hp unit installed in 1955 and a 4200 hp unit installed in 1958—are helping to establish impressive records of efficiency and economy. Together, these two reliable Nordberg engines have cut the plant average fuel-lube cost to just 3.34 mills per kwh. The fuel cost of the new unit is 2.5 mills per kwh.

The municipal power plant at Russell, Kansas is indeed evidence of why taxpayers vote "YES" for modern diesel power.

▲ Chief Engineer Steward demonstrates starting procedure of 4200 hp Nordberg engine to City Manager La Duex.

General view of the 10-cylinder Nordberg 2-cycle, 4800 hp Duafuel® engine installed in the Russell plant in 1955.

▼ The 4200 hp Nordberg Duafuel® unit was installed in 1958. The two Nordberg engines provide 9000 hp to bring plant capacity to 16,220 hp.



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P-380



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**"At S. J. Groves & Sons,  
we've installed Donaclones  
on 275 engines so far."**

*Dave Armstrong, Maintenance Superintendent*



**"Savings in service time and oil,  
and higher cleaning efficiency,  
were main factors in our choice."**

World-famous S. J. Groves & Sons Company, is one of many contracting firms who have installed Donaclones on much of their heavy equipment. During the changeover to Donaclones, priority was given to machines which operate in heavy dust, where Donaclone efficiency and service savings are most marked.

Donaclones are the dominant choice, not only among heavy construction contractors, but also among engine and equipment manufacturers. Nearly all leading builders have shifted or are in the process of converting to Donaclone air cleaners.

Donaclones are 4 ways better. Their 99.9% cleaning efficiency is from 10 to 20 times better than oil-washed types, increasing engine life far beyond what is now considered normal and satisfactory. They use no oil, eliminate messy servicing and cost of oil, too! Servicing time is cut to a fraction of that previously required, and constant, low operating restriction saves fuel.

*Add years to the life of your equipment! Convert to Donaclone protection now. Write or wire for name of nearest distributor.*



**Only 2% of dust  
reaches Duralife  
paper filter!**

Embossing and pleating provide maximum filtration area. Controlled porosity gives 99.9% dust removal.

**98% of dust  
removed here!**

Cluster of Donaclone tubes make up highly-efficient primary centrifugal cleaning stage. Dust is ejected into dust cup for easy servicing.

Paper filters filter best, but it takes efficient pre-cleaning to make them practical from the servicing viewpoint. Note above that Donaclone tubes remove 98% of the dust. Only 2% reaches the Duralife filter, greatly increasing service life.

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St. Paul 14, Minn.

**Donaclone**  
DUO-DRY  
AIR CLEANERS





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**LET'S FACE IT** . . . the threat of war and the atom bomb has become a real part of our life—and will be with us for years. Fires, tornadoes and other disasters, too, may strike without warning.

The very lives of your employees are at stake. Yours is a grave responsibility. Consider what may happen.

When the emergency comes, everybody's going to need help at the same time. It may be hours before outside aid reaches you. The best chance of survival for your workers—and the fastest way to get back into production—is to know what to do and be ready to do it. To be unprepared is to gamble with human lives. Disaster may happen TOMORROW. Insist that these simple precautions are taken TODAY:

☐ **Call your local** Civil Defense Director. He'll help you set up a plan for your offices and plant—a plan that's safer, because it's entirely integrated

with community Civil Defense action.

☐ **Check contents** and locations of first-aid kits. Be sure they're adequate and up to date. Here again, your CD Director can help—with advice on supplies needed for injuries due to blast, radiation, etc.

☐ **Encourage personnel** to attend Red Cross First Aid Training Courses.

☐ **Encourage your staff** and your community to have their homes prepared. Run ads in your plant paper, in local newspapers, over TV and radio, on bulletin boards. Your CD Director can show you ads that you can sponsor locally. Set the standard of preparedness in your plant city. There's no better way of building prestige and good employee relations—and no greater way of helping America.

*Act now . . . check off these four simple points . . . before it's too late.*



SPACE FOR THIS

**CIVIL DEFENSE**

MESSAGE CONTRIBUTED BY

*By Dr. W. A. W. W. W.*





## Allis-Chalmers Selects Twin Disc Torque Converter for TL-14's Tractomatic Transmission

EIGHTEEN YEARS AGO Allis-Chalmers introduced the first torque converter drive in a crawler tractor. That original unit featured a Twin Disc converter, and the same is true of many present-day Allis-Chalmers construction machines. For the optional Tractomatic Transmission in the new TL-14 Tractolader, Allis-Chalmers engineers have once again incorporated a Twin Disc Torque Converter.

This transmission provides the key advantage of power shifting in a simpler, more economical unit. A direction control lever on the steering column actuates forward and reverse clutches hydraulically — changes di-

rections without clutching, shifting gears, or stopping the machine.

*Since reverse speeds are 30% faster than forward, reversing the machine automatically increases its speed.* This eliminates the usual necessity of shifting gears manually to achieve the same effect.

The Tractomatic transmission has four speeds in both forward and reverse. On short haul loading and stockpiling jobs, it is seldom if ever necessary to change speeds once the proper ratio is selected.

A Twin Disc Single-Stage Torque Converter is an integral part of this transmission. Besides increasing

torque automatically as needed, the converter permits rapid clutch engagement and absorbs the shock of the shift in its whirling fluid.

A test of the TL-14 Tractolader at your Allis-Chalmers dealer will demonstrate why so many of America's leading earth-moving equipment manufacturers are standardizing on Twin Disc Torque Converter Drive.



**TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • Hydraulic Division, Rockford, Illinois**

## I-H Acquires Solar Aircraft In Exchange of Stock

International-Harvester Co., has acquired more than 80 per cent of the common stock of Solar Aircraft Co., in exchange for I-H stock, according to Frank W. Jenks, president of International-Harvester. Present plans call for Solar Aircraft to maintain its identity,

operating as a subsidiary of International-Harvester, according to Jenks. Solar's present management, headed by Herbert Kunzel as president, will direct operations of Solar and its properties. "We are especially interested in the gas turbine engines produced by Solar and in their progress in many areas of metallurgy, coatings, electronics and manufacturing techniques," Jenks' announce-

ment said. Solar's main office is at San Diego, Calif. International-Harvester's headquarters are at Chicago, Ill.

## Install New Automatic Test Stand at Perfect Circle

The second automatic tape-controlled dynamometer test stand at Perfect Circle Corp. has been completed and is now in operation. An all-new installation, the test cell includes a new building, new dynamometer, new control panel and equipment and new automatic magnetic-tape programmer. The cell, designated no. 2, is similar to no. 10 cell which was installed in 1956 and has recorded more than 8,500 hrs. of testing in the past three years. Features of the no. 2 cell include operating pressures converted into electrical signals that are read on sensitive electrical indicators. Temperatures are read at the push of a button. The new cell was designed and built by PC engineers and technicians.

## Turbocharging Conversion Kits For Clark Engine-Compressors

Clark Bros. Co., has announced the introduction of complete field turbocharging conversion kits designed for the majority of models in its RA and HRA gas-engine-driven compressor lines. Depending on model, size, shaft diameter and other design criteria, horsepower increases range from 32 percent to 50 percent on the RA Series, and from 20 percent to 36 percent on the HRA Series. The new conversion packages are said to provide a substantial reduction in fuel consumption per bhp and permit increased horsepower output, usually without need for additional cooling service. Neither expanded buildings nor extra operating personnel are required for the extra horsepower. Each turbo conversion package includes not only a jet air started Clark turbocharger, but scavenging air intercooler, dry exhaust manifold, control mechanisms and all other parts required. Complete details on Clark turbo-conversion kits can be obtained by contacting any of Clark's district offices or by writing to Clark Bros. Co., Olean, N. Y.

## Motors, Magnetic Drives Bulletins

Two new product bulletins describing their products are available from the Electric Machinery Co. A single page, color leaflet (1100-PRD-252) describes the E-M line of bracket-bearing synchronous motors. These motors are rated 60 hp and up at speeds from 500-1800 rpm. Suitable for standard voltage connection (60 or 50 cycle), the motors are built in a variety of enclosures for every requirement. Typical enclosures are shown. A new line of variable speed magnetic drives designed expressly for sewage/water pump application is described in bulletin 4400-PRD-263. Built

in vertical construction, the machines are matched to fit standard vertical motors. The drives are air cooled and speed variation is between 0-1740 rpm. Horsepower range is 3-310 hp. An automatic speed control circuit is part of the drive package. The leaflet shows a cutaway construction view and has selection charts and specifications. The bulletins are available from the Electric Machinery Mfg. Co., Minneapolis 13, Minn.

ITS NEW

## National Marine Service Issues Booklet Describing Engineering Services

National Marine Service, Inc., New York, has just published an informative, attractive brochure with illustrations in full color, describing its Engineering Services Department. A large waterways contract carrier, National Marine makes its maintenance, repair, and replacement parts facilities available to other concerns in the marine, gas and electric utility, transportation and pipeline industries. It specializes in handling maintenance contracts and emergency repairs on heavy-duty diesels, pipeline pumps and compressors, heavy trucks, earth-moving equipment, cranes, locomotives, and powerhouse equipment. As the booklet points out, the Engineering Services Department works both at National Marine's service headquarters located just north of St. Louis at Hartford, Ill. and also in the field, transporting men, replacement parts and equipment overland or by air if emergency conditions require. In addition, waterside facilities are provided for complete gas-freeing and steam cleaning of barges, as well as above-water hull repairs and shipfitting activities. Copies of the booklet are available without charge from National Marine Service, Inc., 21 West Street, New York 6, N.Y.

ITS NEW

## Schwitzer Appointments

Carl F. Franz, formerly manager of procurement and programming at Schwitzer Corp., has been appointed works manager in charge of both manufacturing and procurement at Schwitzer Corp. Robert J. Niehaus has joined Schwitzer as manager of procurement and programming.

## Farm Power Brochure

An eight-page illustrated brochure entitled GM Diesel Powers The Most Productive Farm Tractors In The World has been released by GM Diesel. Featuring the Oliver 995 GM Lugmatic, the John Deere 435 Diesel, and the Massey Ferguson 98 Diesel tractors, the brochure gives specifications on each tractor including information on optional and extra equipment. Copies may be obtained by contacting GM Diesel distributors and dealers or by writing GM Diesel, Detroit 28, Mich.



Natural Gas Field station with three 550 hp packaged compressors cooled by Young.

Skid-mounted 440 hp compressor, cooled by Young jacket water cooler, being transported on a truck.

**Young "JWC" UNITS COOL POPULAR NEW "ALL-IN-ONE" PACKAGED COMPRESSORS**


Prefabricated compressors must be ruggedly built to withstand moving from field to field as needs dictate. Young-built Jacket Water Coolers are engineered to "take it" in the field and on the road . . . are built to last the lifetime of the plant. Heavy formed steel channel side members, steel side supports for cores, press-formed heavy-gauge non-ferrous specially reinforced headers are a few of the outstanding Young features that combine to form a rigid unit capable of withstanding severe vibration and shock. New developments of core structure and arrangements of component parts provide greater low-cost cooling.

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## Inland River Reports

By A. D. Burroughs

**JOHN HENRY**, 75x24 ft. towboat completed by Greenville (Miss.) Barge Construction Corp., is in service on the Tennessee River for owner Arrow Transportation Co. Two Caterpillar D397 turbocharged engines supply the rated 1300 hp.

ALLEGHENY Rivermen will soon see the new single-screw dinner-bucket boat operating for Tionesta Sand & Gravel, Inc., Pa. The 35x10 ft. craft, under construction at Humboldt Boat Service, St. Louis, will be equipped with a GM (Detroit) 4-71 engine for propulsion power.

**MOBIL 8** is the name for the new tug slated for coastal port and deep-water service plus duty in the canals, inland rivers and lakes. Owned by Socony Mobil Oil Co., built by Ingalls, the 89 ft. 9 in. x 25½ ft. tug carries a 16 cyl GM engine rated at 1640 bhp giving a rated 15 mph free running speed, 9 mph towing speed.

IN drydock at Nashville Bridge Co. is the familiar U.S. Coast Guard cutter, *Goldenrod*, slated for new GM 8-268A engines, doubling her present rating of 200 hp per shaft. This craft is a 'regular' on the Illinois, Tennessee, and Upper Mississippi Rivers.

CAPT. Ed Hays, Signal Mt., Tenn., accepted delivery of his new 60 ft. diesel yacht, *Sally H. V.* Two GM (Detroit) 6-71 engines rated at 235 hp each supply power for this luxury item completed by Burger boatyards, Manitowoc, Wisc.

**J. J. CAVETT**, 42x19 ft. harbor towboat recently completed by Jones and Laughlin, Aliquippa, Pa., is gaining favorable reports from riverfolks along the upper Ohio. The craft has 450 hp delivered from two GM engines.

PARKHILL-Goodloe, dredging firm at Jacksonville, Fla., will add a new diesel towboat to its working equipment. Still in the paper-stage, the 45 ft. craft will have two GM 6-71 engines for push-power.

**SUPERIOR**, a new power-beauty completed by owner Superior Boat Works, Greenville, Miss., is working with push-power supplied by twin GM (Cleveland) engines, model 16-278A. The 130x37 ft. vessel has a rated 3200 hp.

BACK at home port, Evansville, Ind., we saw the old friend, the 117 ft. *J. W. Bedford*. A busy towboat, summer and winter, built in 1950 by Maxon Construction Co. for Bedford-Nugent Co.,

Evansville, Ind., power comes from two Enterprise DMG-8 engines.

THE towboat *Hugh C. Blaske* will soon have a new name with new owners Twin City Barge and Towing Co., St. Paul. The oft-seen craft was sold by Blaske, Inc., Alton, Ill.

MISSOURI Dry Dock and Repair Co.,

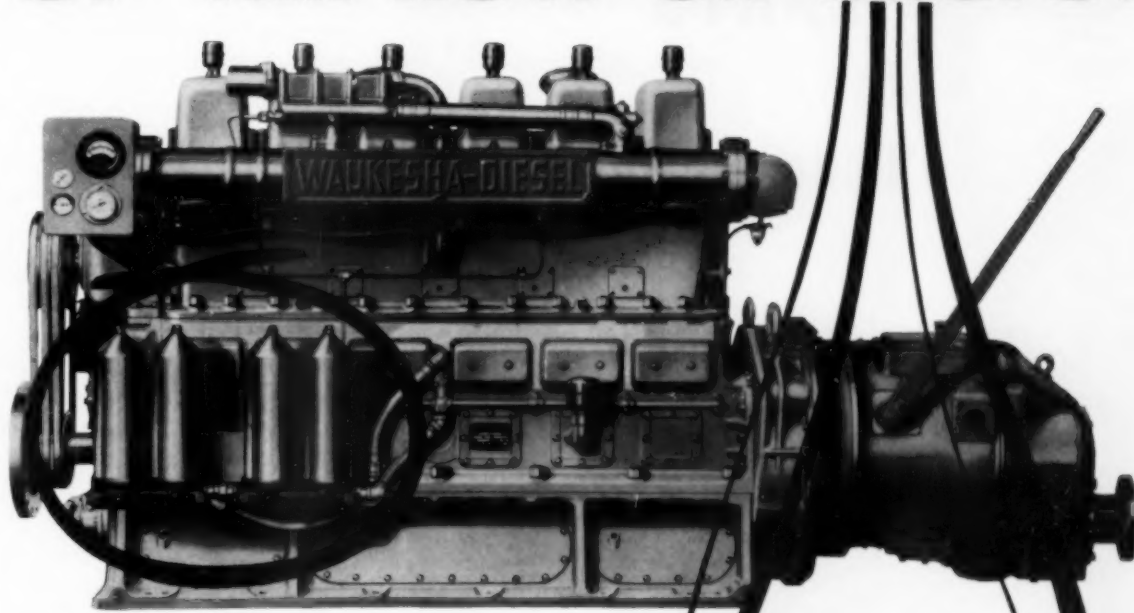
Cape Girardeau, is installing two GM engines on the *Fleetwood*, operated by Fleet Towing Co., Carlinville, Ill. The repowering will give the craft a rated 1800 hp.

*U.S.S.-2* is the name of the new harbor tug delivered by Marietta Manufacturing Co. The 48x15 ft. tug, powered by two GM 6-110's, works for owner U.S.

Steel. The craft had been scheduled to carry the name *Li'l Caroline*.

**GIRLIE KNIGHT**, newest towboat for a new firm, Mid-South Towing, Tampa, was sighted on water, making excellent time and performance with power from the twin 1600 hp Fairbanks-Morse model 38 OP engines.

# WAUKESHA Engines rely on WINSLOW CP\* full-flow oil filters!



Waukesha "Defender" LRDB Marine Diesel  
One of many Waukesha Gas and Diesel Engines  
using Winslow CP\* Full-Flow Filters as standard equipment.

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Two materials—Fine and Superfine—in each Winslow CP\* element continuously self-adjust pressure, give TRUE full-flow of filtered oil, without incurring excessive back pressures.

You can depend on Winslow CP\* Filters for round-the-clock filter protection!

Write for: "The Stirring Saga of  
Big Drip and Little Drip!"  
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\*CP Controlled Pressure. Patented, U. S. and foreign patents.

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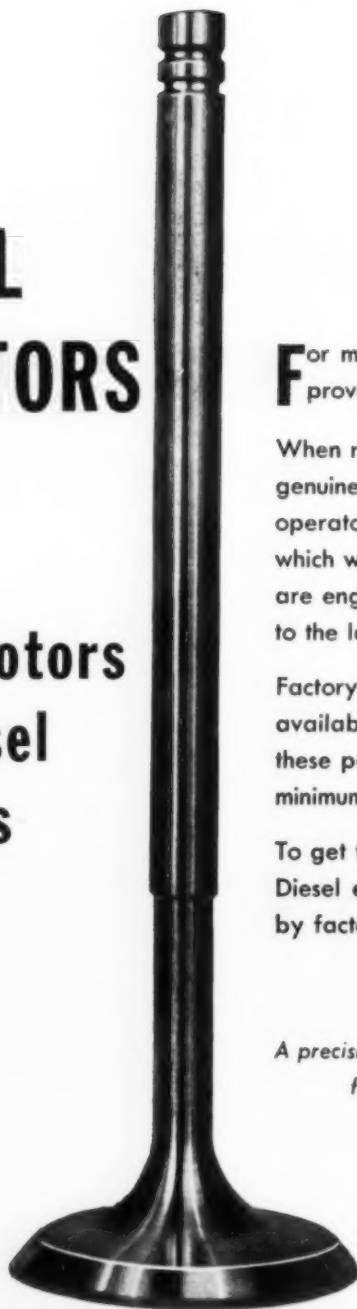
Export Division: Oceanic Export, San Francisco, Calif.  
European Plant: Epernay, France.



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*Tie up to  
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**F**or marine service, GM Diesel engines have proved to be dependable and economical.

When replacement parts are necessary, genuine General Motors parts will give the operator the performance and dependability which was built into the engine. These parts are engineered and precision built to the latest design.

Factory-trained service personnel are available throughout the country to install these parts with a minimum of cost and a minimum of downtime.

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*A precision-built valve  
for a GM Diesel engine.*

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# PLEASANT HILLS TREATMENT PLANT

**Growing Pittsburgh Suburban Areas Join to Build a New Sewage Treatment Plant; Four Climax Gas Engines Drive Blowers and Pumps, Save \$5,000 a Year In Fuel Costs**

By RICHARD S. DODDS\*

**P**LEASANT Hills is a small, suburban community eight miles south of Pittsburgh, Pa., enjoying most of the same growing pains of any modern middle class community. The borough, with a population of 7,000 has no industry and, with the exception of two large shopping centers, is 100 per cent residential. Land which was farmers' fields in 1940 is now covered with the homes of new suburbanites.

Not the least of the growing pains was the problem of sewage disposal. Pleasant Hills had operated a sewage treatment plant built in 1940 but the plant's limited capacity of 180,000 gpd made it too small to handle the increased population. Geographic location of the area made it financially

\*Supt. Pleasant Hills Authority

unsound to join with Allegheny County's new \$100-million primary treatment plant on the Ohio River so the borough was faced, with surrounding communities, of solving its own treatment problem. This was done by entering into a contract with three neighboring communities to buy the Pleasant Hills service and construct a plant large enough to service all four communities.

Because the stream into which the plant effluent was to be discharged had a flow of only two fps in its 10 ft. width and average one ft. depth, it was necessary to obtain the greatest possible percentage of solids removal and the activated sludge treatment method was chosen. The engineering firm of Consoer, Townsend & Associates was retained to design and supervise construction of the plant on a 5½ acre tract in the Lick Run water shed

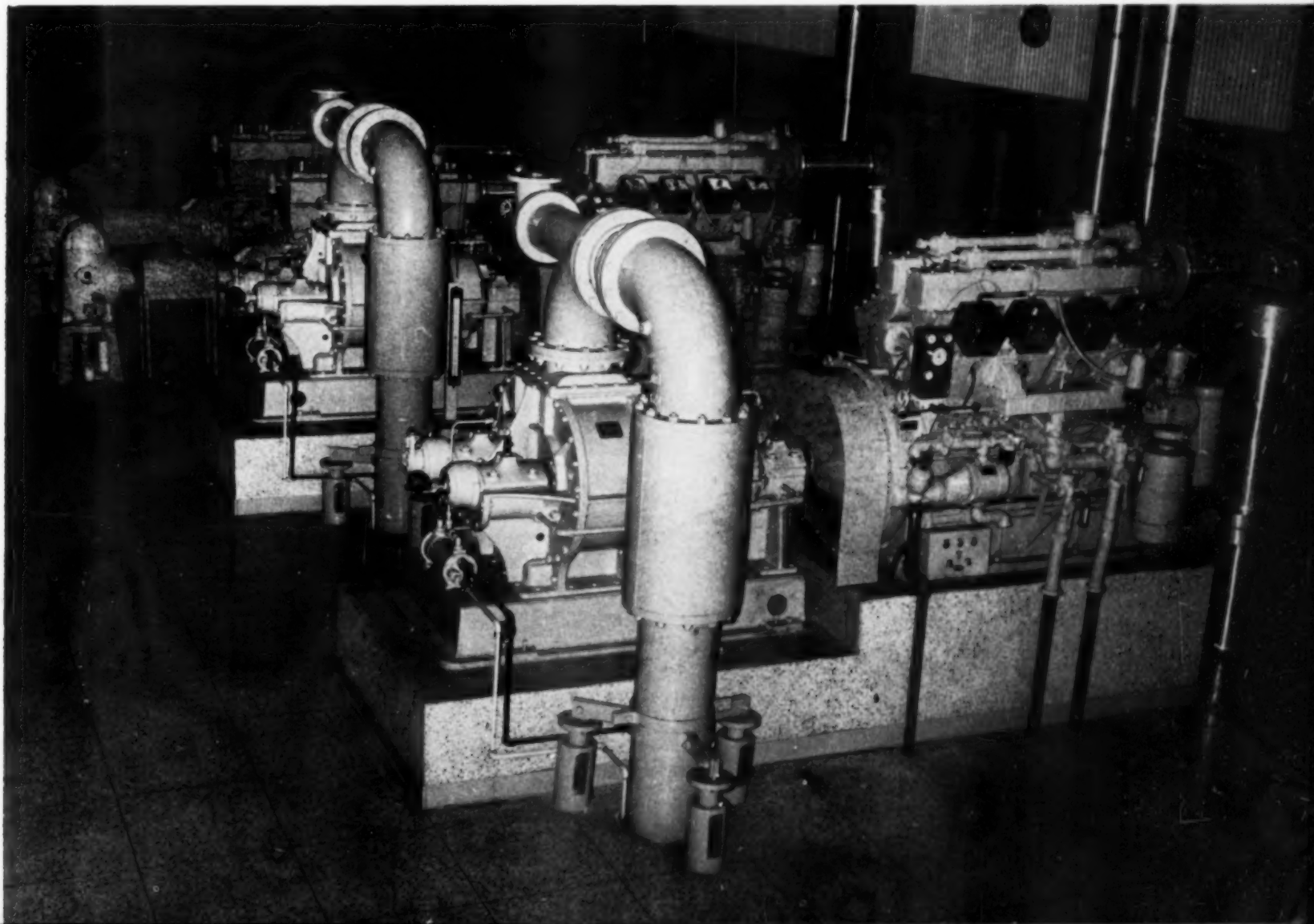
in Snowden township. Installed in the new plant are four Waukesha Climax gas engines which utilize gas from the sludge digesters as part of their fuel, for a savings estimated at \$5000 a year.

Design maximum of the new plant is 4.5 million gpd, based on a present population of 20,800 in the four cooperating communities of Pleasant Hills, Snowden, Baldwin Borough and White Hall, with calculated sewage flow of 3-million average gpd. Cost of the plant, including one pump station, was approximately \$1.5-million. The plant was designed so that, with addition of one more blower unit and doubling our present tank capacity, it could go to 6-million gpd.

Placed in operation on August 17, 1959, the new plant will be formally dedicated on April 9th. The

Two Climax K-67 and two Climax V-80 gas engines, foreground, drive Worthington sewage pumps and Roots-Connersville sludge aeration blowers at the Pleasant Hills sewage treatment plant.

17





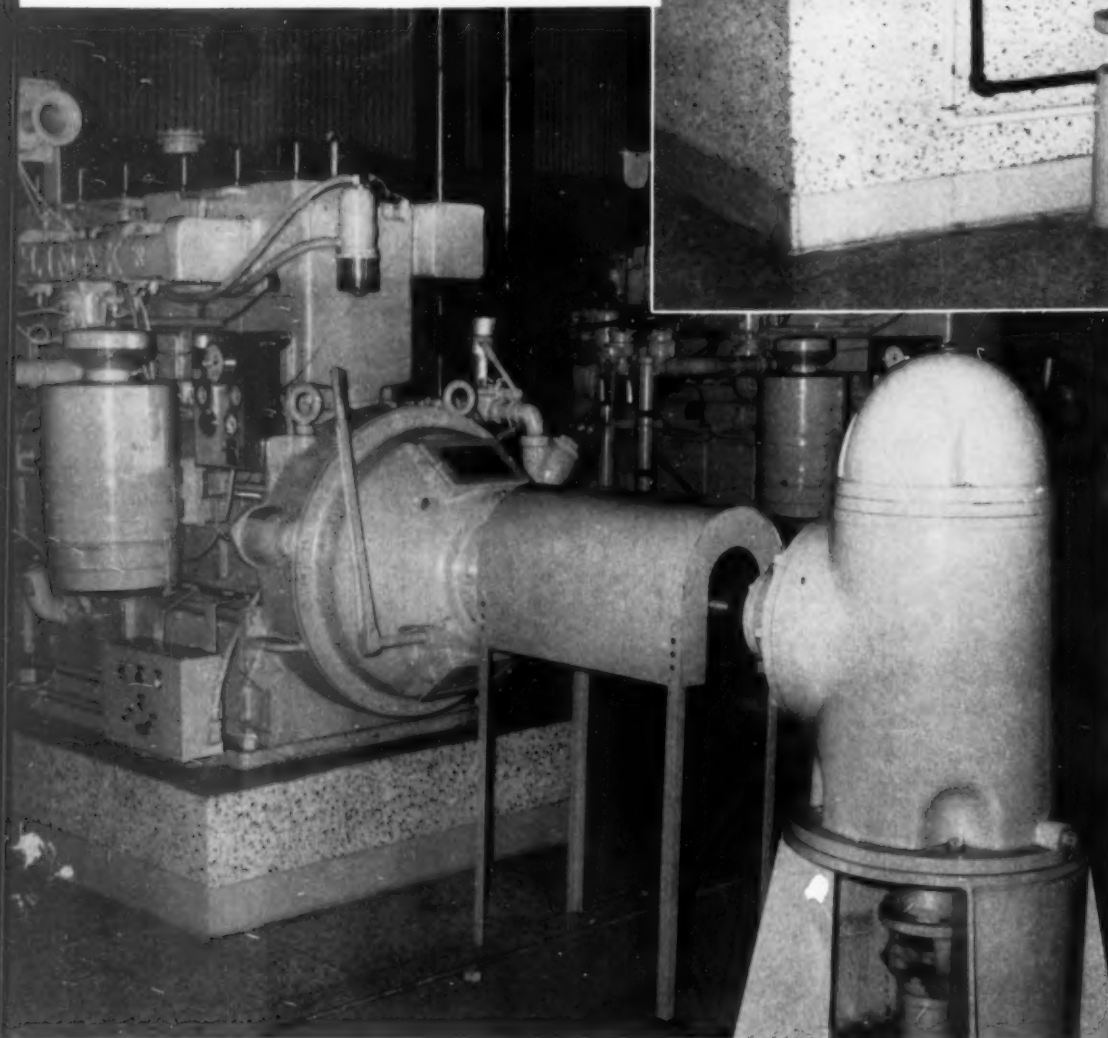
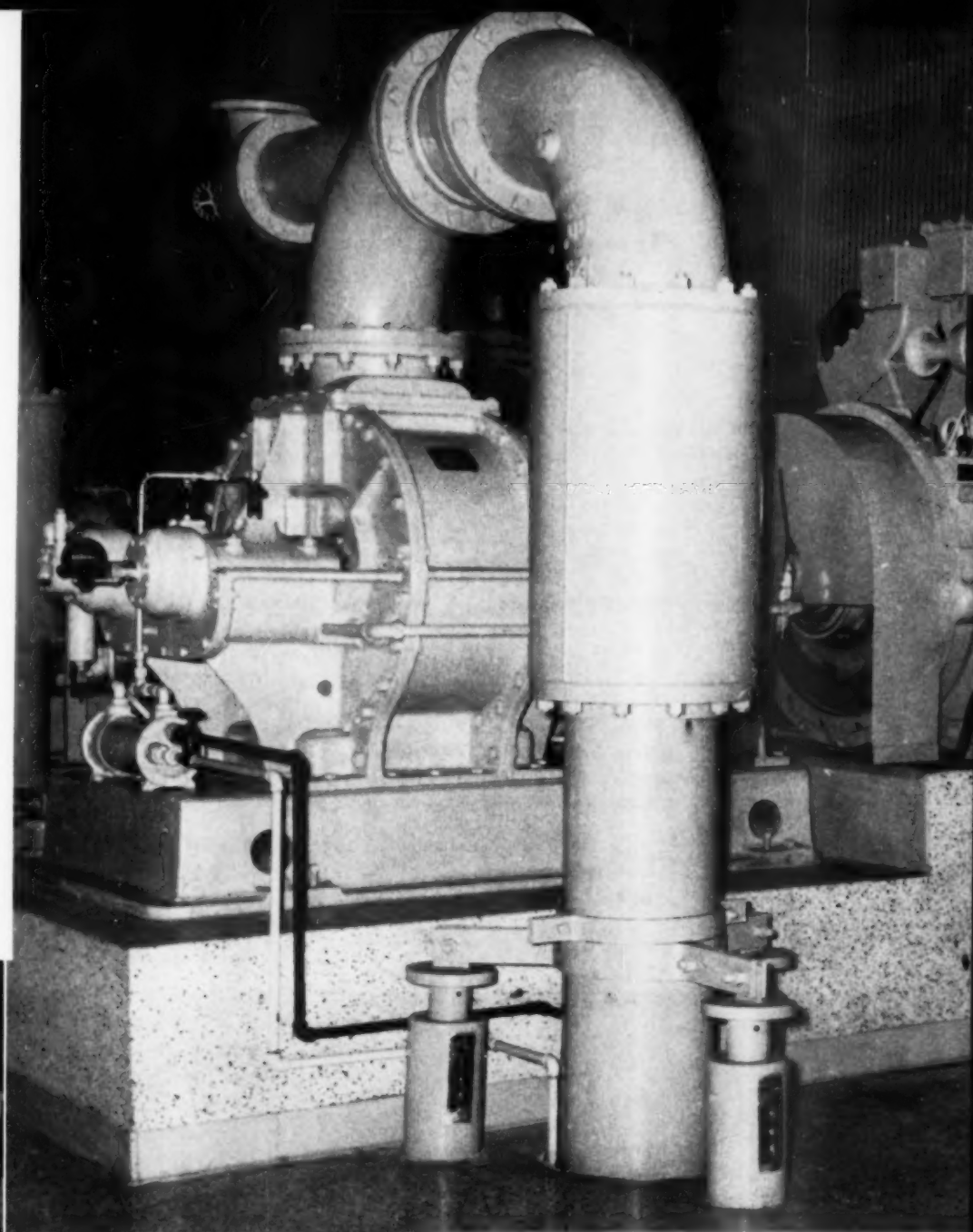
Closeup of one of the Climax V-80 gas engines and Roots-Connersville 3000 cfm rotary blowers. Note Vortex air cleaner and Ensign carburetor. Engine-to-blower coupling is through Twin Disc clutch, Airflex coupling.

first 1960 meeting of the Western Operators Section of the Pennsylvania Sewage and Industrial Waste Association will be held in our new plant in May.

The methane gas from the sludge tanks is mixed with natural gas to fuel the four Climax gas engines, two of which power the raw sewage pumps, the other two the blowers for sludge aeration.

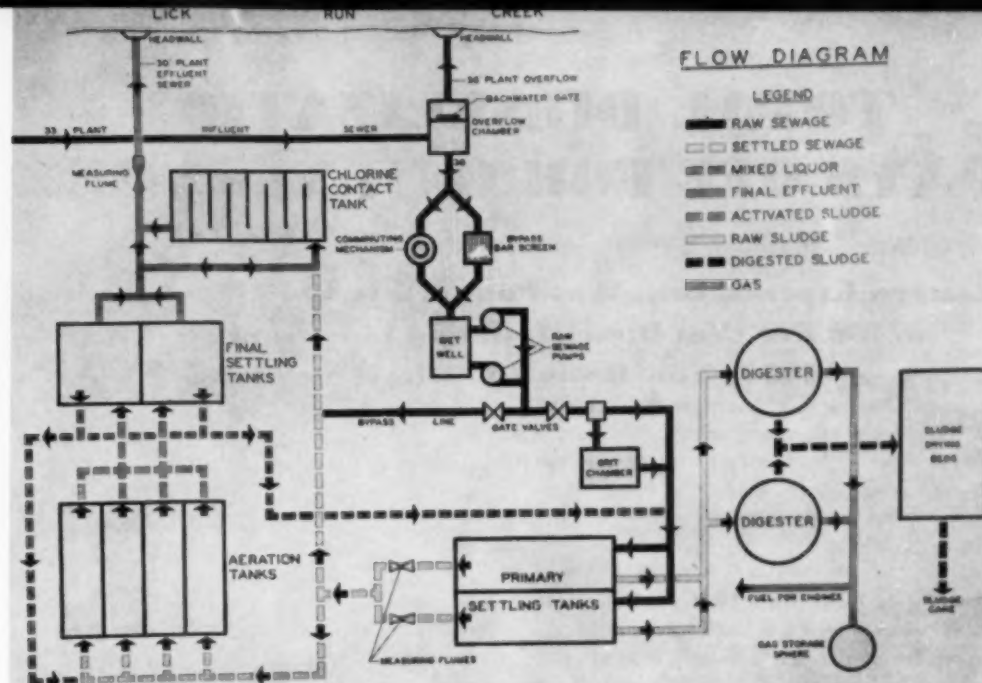
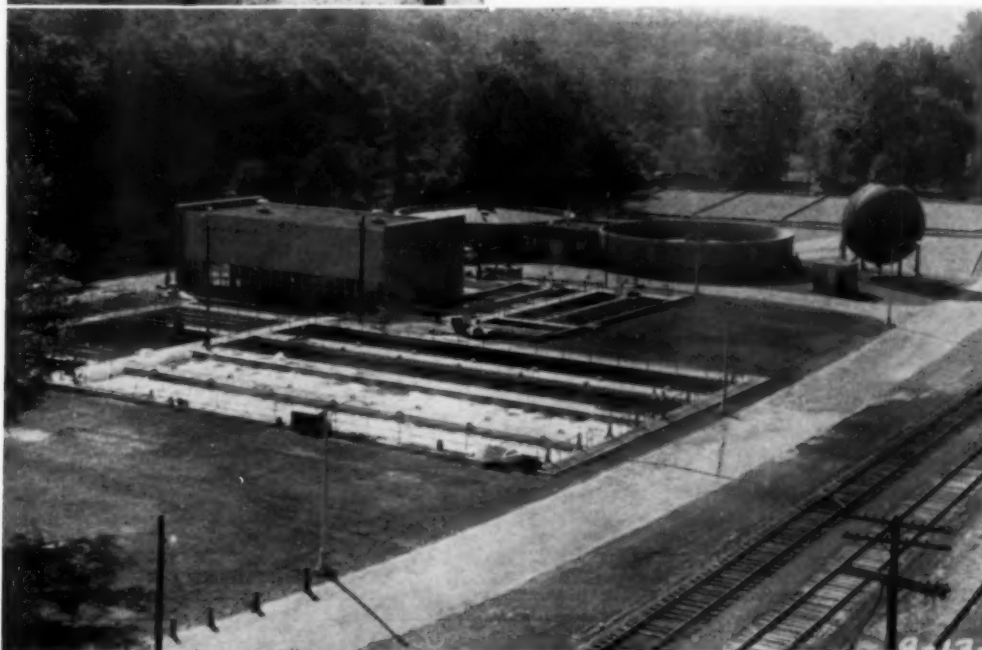
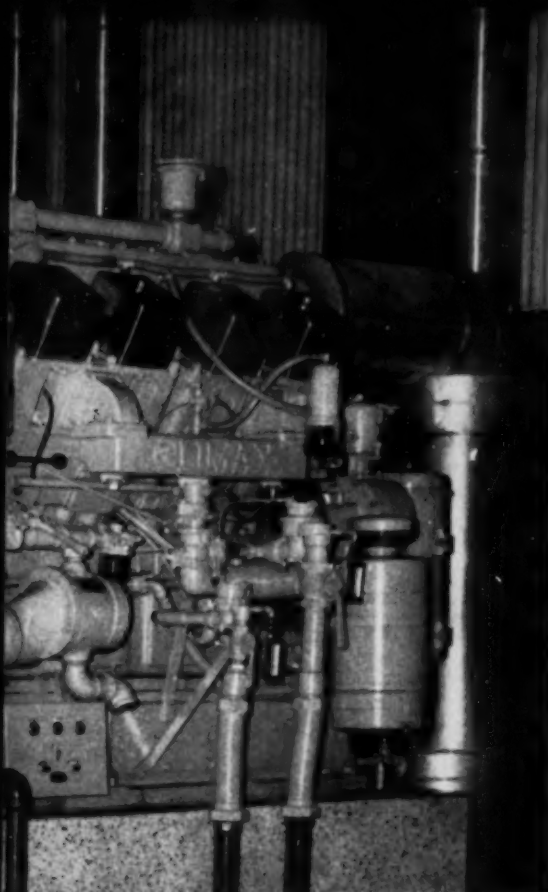
The two Climax gas engines driving the raw sewage pumps are model K-67's, 6 cylinder, vertical type four cycle units with a 7 x 7 in. bore and stroke, giving a 1616 cu. in. displacement. The engines are rated at 103 bhp at 720 rpm. They drive Worthington 16 in. model MCZ-1 vertical volute pumps through Twin Disc friction clutches, and angle gear drives. Pump range is 1,000 to 4,200 gpm. The blower engines are model V-80 units driving Roots-Connersville 3000 cfm rotary positive blowers through Twin Disc friction clutches and Airflex couplings. The V-80 is an eight cylinder, four cycle, V-type engine rated 137 bhp at 720 rpm with piston displacement of 2155 cu. in.

Closeup view of the K-67 Climax engines which drive Worthington 16 in. vertical pumps through Twin Disc clutches. Engines are rated 103 hp at 720 rpm.



and, like the K-67, has a 7 x 7 in. bore and stroke. Blower air passes through both mechanical and electrical filters before reaching the blowers.

All the Pleasant Hills engines are equipped to burn natural gas, sewer gas or a combination of both. Carburetors with atmospheric regulators automatically blend natural gas with the gas from the sludge digester to feed a fuel mixture with proper Btu value. The sewage gas has a value of 600 Btu and the natural gas piped to the plant 1000 Btu. All engines have two spark plugs per cylinder; the V-80 has four magnetos while the K-67 has two. Engine equipment is similar in most other respects, including mechanical centrifugal governors, low oil pressure and high water temperature alarms and shut-down controls, air motor starting systems and engine instrument panel. Heat exchangers on the jacket water system and exhaust stack outlets provide heat for the 860,000 gal. sludge digester tanks, plus heat for all of the buildings as well as domestic hot water for the plant. With the heat recovery system it is possible to keep the digester temperature at the desired 95 degrees with little or no extra help from the sludge heater which is also fueled with sewer gas



Flow chart, Pleasant Hills treatment plant.

or natural gas or a combination of both. Jacket water from the engine, after passing through the heat exchanger, is cooled in a coil running out through the sewage tanks, thus eliminating radiators on the engines. The engines are housed in a 38 x 80 ft. two story main equipment building.

The Climax engine pairs are operated in 30 day rotation periods. During the rest period, plant personnel perform necessary servicing and preventative maintenance. Oil and oil filters are changed every 1500 hours. All engines are of the crankcase oil storage type with a capacity of 35 gals. each. Fuel consumption is 24,000 cu. ft./day for one 8 cylinder V-8 engine and one 6 cylinder inline engine.

Contracts were let in early 1958 and the new plant went into operation 420 days later, on August 17, 1959. Plant personnel include a plant superintendent, a chemist and four operators. Members of the Pleasant Hills Authority, which

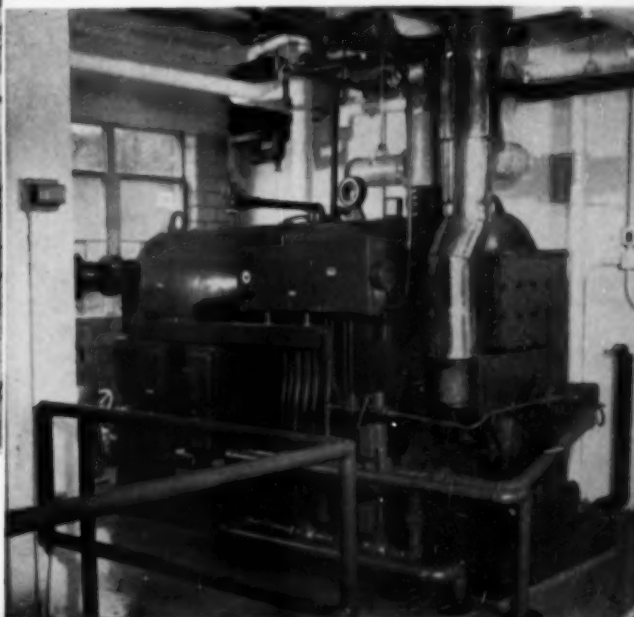
was responsible for construction include Thomas Pratt, chairman; Robert McCarthy, secretary, and Dorsey Dick, F. Bice Johnson and the writer.

### Principal Equipment Pleasant Hills Treatment Plant

Gas Engines	Waukesha Climax
Blowers	Roots-Connersville
Raw sewage pumps	Worthington
Blower couplings	Falk
Clutches	Twin Disc
Heat recovery silencers	Maxim
Ignition systems	American Bosch
Carburetors	Ensign
Lube oil filters	Winslow
Heat exchangers, water and lube oil	Ross
Thermostatic control	Minneapolis-Honeywell
Intake air filters	Vortex
Cooling water pump	Viking
Starting air compressor	Ingersoll-Rand
Governor	Pierce
Blower intake air filters	American Air Filter

Pleasant Hills treatment plant grounds. Engines are housed in two-story building; settling tanks are in foreground, sludge digesters are round buildings to rear. Gas storage tank is at right.

Chicago Cyclotherm sludge heater supplements jacket water heat. It operates on either natural gas or sewage gas or a combination of both.





# TOTAL DIESELIZATION PAYS OFF FOR OTR TRUCKER

**Eastern Express, Inc., Was Founded in 1946, Made Switch  
to 100 Per Cent Dieselization in Line-Haul Fleet in  
1955; Now Owns 483 Diesel Tractors**

By DWIGHT P. ROBISON

**W**E all know that a lot can happen in 14 years, but what has taken place at Eastern Express Inc. in this time is nothing short of amazing. Back in January, 1946 when Wilson M. House founded Eastern Express in Terre Haute, Ind., there was no company owned equipment, a handful of employees, and only three very meager terminal facilities.

But the infant carrier took hold, started to grow, and soon proved to be one of the fastest growing motor carriers in history. Today Eastern Express is one of the nation's largest common carrier trucking companies of general commodities. It now owns all of the equipment it operates (about 2,400 pieces), employs more than 2,500 people, and has 26 installations in the 11 states in which it operates, stretching from the Eastern seaboard to St. Louis and Chicago. In 1946, Eastern's revenues totaled a little over \$1 million. This year the carrier expects revenues to reach a figure in the neighborhood of about \$35 million.

Because of the carrier's rapid and continually accelerating early growth, it was a problem for equipment and maintenance schedules to keep up with service demands. However, the importance of providing a continuing, dependable service was not overlooked, and these all important areas of the operation were given the money and attention they demanded.

In September of 1955 the carrier commenced a 100 per cent diesel engine operation in its line-haul tractor fleet. Prior to that, it had operated 30 Mack model LJT tractors equipped with Cummins NHB engines, and 35 GMC model 750 tractors with GM 4-71 engines. The rest of the fleet was equipped with gasoline engines. Today, Eastern's line-haul tractor fleet totals 483 units. It consists of 327 Macks, equipped with Mack END-673, 170 hp diesel engines; 136 Whites equipped with Cummins NH-180, NH-195, NHB, and NH-220 hp engines; and 20 GMC tractors equipped with GM 6-71 diesel engines.

All are equipped with fuel oil filters, #500 or #750 engine oil filters, and standard wet-type air filters. None have turbochargers. Transmissions used on the Mack equipment are the Mack model TRD72 10 speed direct in 10th, and on the GMC and White equipment it is the Fuller RoadRanger 10 speed direct in 10th. Axles on the Macks are the Mack dual reduction 4.58-1 ratio; on the Whites

the White single reduction 4.625-1 ratio, and the GMCs use the Eaton single reduction. Standard tire size is 10.00 X 22.

Eastern's comprehensive maintenance program is headed by Robert L. Douglas. Before joining Eastern Express in 1954, he had served as a service manager for Mack trucks, maintenance engineer for the California Truck Rental Co., and equipment engineer for ATA's Common Carrier Conference. All told, he has more than 20 years experience in transportation. In addition to the maintenance of the 483 line-haul tractors, his department is responsible for 264 city tractors, 163 city pick-up and delivery trucks, and 1,309 city and line-haul trailers.

## Service and Test Equipment Complete

To efficiently meet the service demands of all this equipment, Eastern maintains 12 garages. The

One of the top men in the trucking business is Robert L. Douglas, director of fleet maintenance at Eastern Express.

General office building at Terre Haute, Ind., headquarters of Eastern Express.







One of 136 White tractors operated by Eastern Express. Unit is powered by Cummins NH-220 diesel equipped with Fuller 10 speed transmission.

major garage installations are located at Bedford, Pa., Bridgeport, Conn., Metuchen, N.J., Terre Haute, Ind., Chicago, Indianapolis, and St. Louis. In addition to these, garages for providing general service and the maintenance of city equipment are located in Harrisburg, Pa., Cincinnati, Dayton, Philadelphia, and Pittsburgh. The hub of the carrier's maintenance activities is Bedford, Pa. Here all major component rebuilding is accomplished, and until recently the maintenance department office was at Bedford. When the company occupied its new general offices in Terre Haute last year, the maintenance office and accompanying records were moved to them. The garage facilities are excellently equipped, and the necessary components and tools are readily available. For example, a partial list of the equipment at the Bedford installation includes: Tire micro-siper (all tires are micro-siped); Bear front wheel and axle alignment pit, complete with all tools; vapor degreaser; vapor blast parts cleaning machine; heavy duty steam cleaners; crankshaft alignment stand; engine dynamometer; chassis dynamometer; heavy duty presses; heavy duty engine overhaul stands; heavy duty valve refacers; heavy duty wrist pin hones; boring bar; brake drum grinder; brake doktors; connecting rod and piston alignment equipment; diesel nozzle check and test equipment; diesel fuel pump test stand; and all the other thousand-and-one miscellaneous tune-up and test tools.

Let's take a look at Eastern Express' operating conditions. The units travel over first class state and U.S. highways, and turnpikes. Maximum gross loading must conform to the 60,000 lbs. limit of



Unit rebuild shop at Bedford. All engines, transmissions, differentials and many other smaller components are overhauled. Construction has been undertaken to enlarge the shop.

Eastern gets up to 350,000 mi. with diesels before overhaul. Here a Mack END-673 is run-in and tested on a Clayton dynamometer prior to installation.

one state, and, because of extensive inter-line operations, equipment must meet the general specifications of all the states. Because of the area of the country in which the carrier operates, most of Eastern's 40 million miles a year are run on congested highways and city streets. An average over-the-road haul will be about 770 mi., with a gross load of 60,000 lbs. and a 35,000 lbs. pay-load. The carrier does not operate on tight, inflexible sched-

ules, but dispatches are centrally coordinated at the general offices and competent dispatchers are located at the various terminals.

### 100% Dieselization a Must

The equipment is maintained according to a prescribed preventive maintenance program, utilizing forms designed by the carrier's maintenance department. The program is constantly reviewed and revised, as experience dictates. In addition to the regular maintenance program, a full tire preventive maintenance and control program is conducted. And with 16,000 tires being operated everyday, it's no small program and is under the direction of a tire maintenance superintendent. In the equipment maintenance program, the line-haul tractor fleet is replaced on a progressive basis, and the mileage on any given piece of equipment may vary from just overhauled to 350,000 mi. With a relay operation such as Eastern Express', where the equipment is driven by many different men, the best possible equipment life can't be expected and it is difficult to arrive at a real average mileage between overhauls. Some new equipment fails at extremely low mileage, and many original engines are operating with more than 350,000 mi. (Some of the company's oldest diesel tractors have operated



for almost 500,000 mi.) Eastern's engines are normally governed at the manufacturer's specifications, or 2100 rpm.

Concerning the carrier's maintenance program and its use of diesel engines, Douglas said, "According to our experience—from a 100 per cent gasoline engine line-haul operation, to a partial diesel engine operation, to a 100 per cent diesel engine operation—we see now that we could not have afforded *not* to go to the diesel operation. The relative fuel costs per mile for the same horsepower engine are considerably less. The same horsepower diesel engine gives less trouble enroute, has lesser malfunctioning, and its basic life is considerably more miles than the gasoline engine. Result: An improved maintenance cost per mile for the diesel engine over the gasoline engine."

However, he pointed out that in his opinion there is still considerable improvement needed

Mack tractor, 327 of which are operated by Eastern, is powered by the Thermodyne 170 hp, 2100 rpm diesel.



Bedford, Pa., overhaul shops.

One of the latest innovations at the unit rebuild is the vapor blast and vapor degreaser used for cleaning all parts that can be handled by hand. Imparts like-new appearance.

in the basic design of some makes of the diesel engines. He said some makes still have extremely troublesome features which add unreasonably to the maintenance costs. He feels that considerable improvement is still required in the plumbing systems, generators, cylinder head gaskets, fan and water pump belts, and radiators. But, in summary, he said, "Diesel engines have been an extremely important factor in providing the service we afford our customers. And that's our basic objective for a successful business operation."

#### TRACTOR PREVENTIVE MAINTENANCE SERVICE

SCHEDULED 900 - FORD WHITE MODEL W-6000 TRACTORS

TRACTOR NO.	OPERATOR	DATE	COMMENTS
1	2	3	4

INSPECTION CHECK - PREVENTIVE MAINTENANCE		OPERATION	
1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20
21	22	23	24
25	26	27	28
29	30	31	32
33	34	35	36
37	38	39	40
41	42	43	44
45	46	47	48
49	50	51	52
53	54	55	56
57	58	59	60
61	62	63	64
65	66	67	68
69	70	71	72
73	74	75	76
77	78	79	80
81	82	83	84
85	86	87	88
89	90	91	92
93	94	95	96
97	98	99	100

Eastern's PM form for White tractors.



# TV STATION PROTECTED BY DIESEL UNIT

By ED DENNIS

**F**LORIDA'S Gold Coast's newest television station, WPST, channel 10, Miami, which began operating in 1957, has insured itself against interruption by installing a General Motors diesel generating set equipped with automatic starting facilities as a source of standby electrical power.

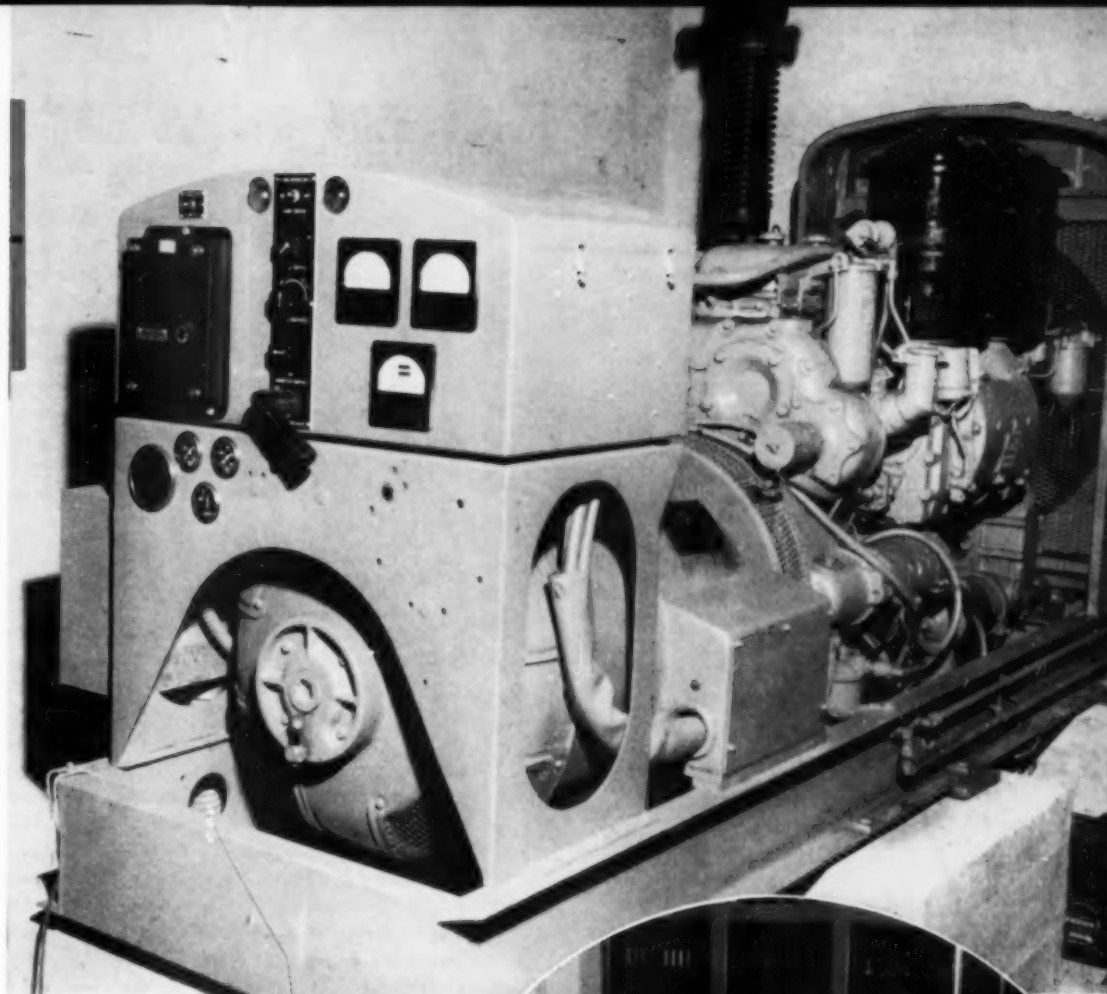
The WPST-TV building, where the main studio is located, was designed to provide the South Florida area with a most modern television facility in a beautiful and efficient structure. The transmitter plant is located on the antenna farm at 199th st., and U. S. Highway 441. This new and modern structure operates on maximum power with a standby General Motors dieselized unit to supply the auxiliary transmitter and insure the television station against loss of air time due to equipment or electrical power failure.

Being in the hurricane belt, the structure is of CBS construction with steel reinforced precast concrete beams and built on an elevation well above the flood danger level. The building houses the stations regular RCA type TT58 main 50 kw transmitter and RCA type TT10H10 kw auxiliary transmitter. The auxiliary generating unit is composed of a GM 6 cylinder series 71 diesel engine. The generator is a Delco, rated 100 kw, 125 kva, 3 phase 60 cycle 347/173.5 amp and 301/150.5 amps.

The engine foundation, built well above the floor, is made of I beams bolted to three separate steel reinforced concrete foundation beds to insure smooth, vibration free, operation. The generating unit takes care of the station's RCA type TT10H, 10 kw, auxiliary transmitter and has the same power range as any TV station in a big northern city. The generator also supplies power for the tower lights, micro wave equipment, stabilizing amplifiers, control console, building lights and various blowers.

The unit has GM automatic controls and upon failure of the regular commercial power the engine will automatically start and produce power within five seconds. Since the set was installed two years ago it has been called upon about a half dozen times for durations up to an hour.

WPST Channel 10 televisions main 50 kw and 10 kw transmitter located north of Miami, Florida. The GM diesel generating set is housed in a sound proof room adjoining the main control room.



The General Motors 6-71 diesel generating set with the 100 kw Delco generator. The unit also has Woodward hydraulic governors to assure precise frequency control, Donaldson air cleaners and AC fuel and lube oil filters.

The control board in the transmitting room. In the event of an emergency the building is a self contained unit and can be used by the civil defense authority.





# ALCO'S PACKAGED POWER FOR DRILLING

**L**ARGE diesel-electric packages, which have had several years of successful operation on off-shore oil rigs, promise to find an important prime mover market in oil well drilling on land. Two main forces account for the bright outlook for the diesel-electrics: the trend toward deeper holes, which require more power, and great competitive pressure on contractors to lower operating costs.

The cost of a well increases sharply with increasing depth. Figures from the year 1956 showed the average cost of 14,006 wells in the 2500 ft. to 3750 ft. depth range was \$26,500 per well, while the average for 150 wells deeper than 15,000 ft. was in excess of \$500,000 per well. The competition of many small drilling contractors makes the footage rate paid for drilling very sensitive to economic conditions, and these conditions have driven the footage rate steadily downward from an average of \$5.85 a ft. in 1952 to \$4.50 a ft. in 1958. Under such circumstances, the contractor is intensely interested in new equipment which will enable him to obtain profitable contracts.

Last year the Bullard Drilling Co. converted one of its steam-powered rigs to Alco Products, Inc.'s diesel-electric power. Recently, the rig completed its first contract—a 16,000 ft. hole for the Austral Oil Co. on a Miami Corp. lease in the Little Chenier section of Louisiana. The rig's performance gave strong indications that diesel-electrics represent a lot of the future in drilling.

Alco shipped the nine new skids of the power package from its plant in Beaumont, Tex. by flat-bed trailer to the site. The last leg of the trip was over a board road to the wellsite in a marsh. Despite the soggy location, all the skids were easily installed, and hooked up on the site.

Bullard Drilling Co. rig is shown while drilling 16,000 ft. hole in Little Chenier section of Louisiana. Rig equipment, including Alco diesel-electric power package was hauled over marshland on board road, foreground.

Skid mounting allows convenient placement of power package at well site.

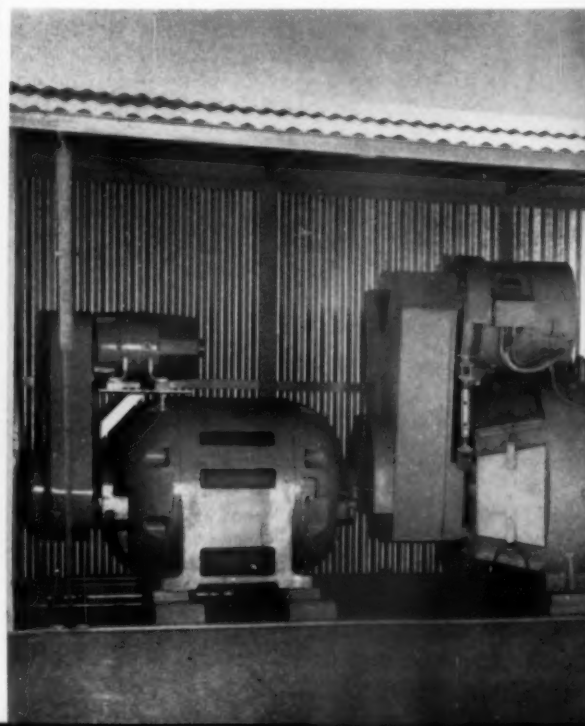
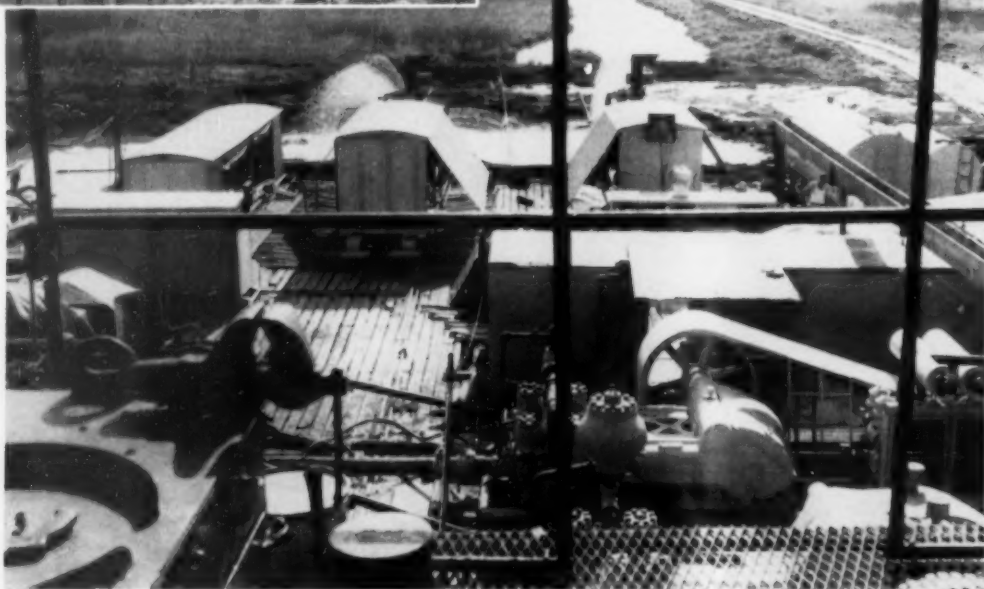
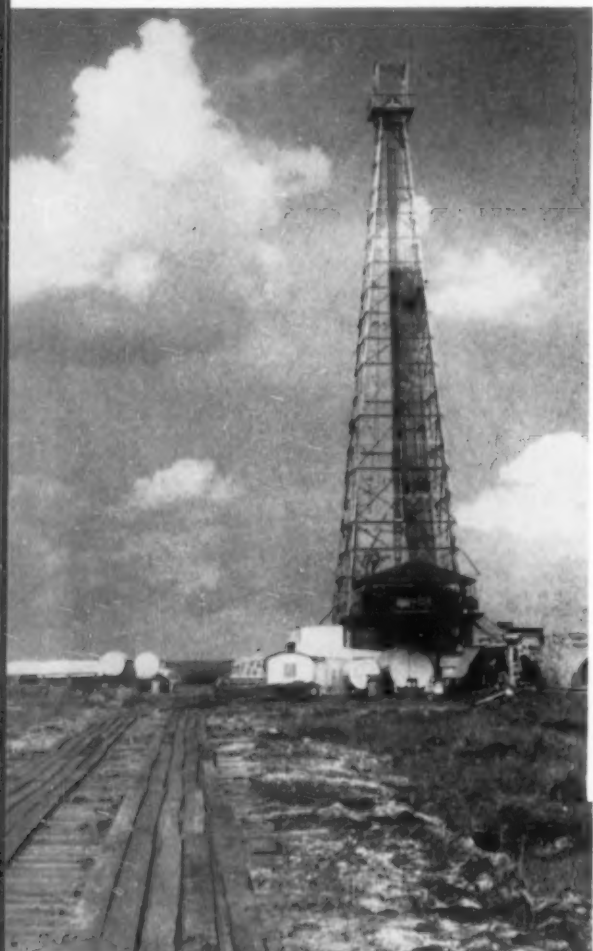
Fuel consumption on the Austral Oil contract demonstrated the economy of the diesel application. Comparing the average total daily fuel bill for diesel operation with that of the previous steam power, a Bullard official said, "We cut our fuel bill by more than half." Typical total fuel costs for contractors using rigs with two Alco engines are \$70 per day for an 11,500 ft. hole, and \$76 for a 14,000 ft. hole. They contrast markedly with typical gas bills for operators of steam rigs—which can range up to \$300 per day.

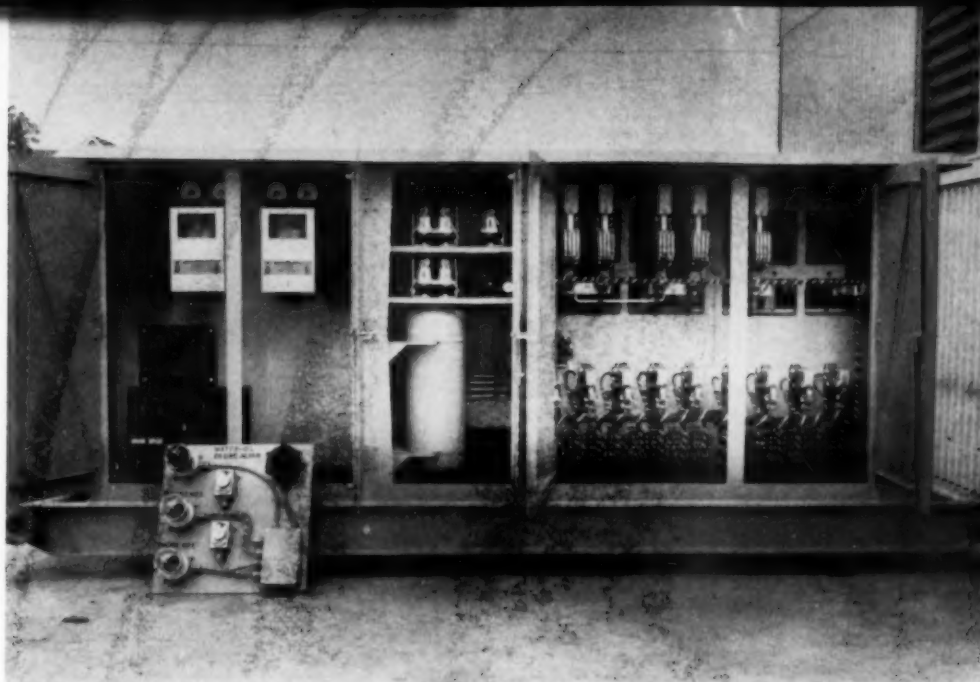
The two diesels in the Bullard rig are six cylinder, four cycle Alco model 251-B's. They are turbocharged, inline engines rated 975 hp at 1,000 rpm with bore of 9½ in. and stroke of 10 in. Each of the big diesels drives two 650 kw, dc main generators which are directly coupled to the engine. These generators in turn drive the rotary, an Ideco "Big Giant" drawworks, a 1000 hp Wilson-Snyder main mudpump and a Wilson-Snyder main mudpump rated at 800 hp. With this arrangement the Bullard No. 3 can drill to depths greater than 15,000 ft. with 4½ in. drill pipe and much deeper with smaller pipe. Also part of each set are a dual-armature generator exciter and a 50 kw, dc auxiliary generator. In addition, one of the sets has a 150 kw 440 volt alternator coupled to the second main generator.

Each main generator has an overcurrent capacity of 200 per cent for 30 seconds, occasionally applied. Generator field windings limit such overloads to 2000 amps, however. Terminal voltage is 950 volts at no load, 575 volts at rated output, and approximately 50 volts at 2000 amps.

The drive motors on the Alco package are standard railway traction motors modified for drilling service. They have an intermittent rating of 800

Standard Alco engine-generator unit for drill rig power package has model 251 engine rated 975 hp driving two GE 650 kw dc generators. Auxiliary GE 150 kw alternator at end of No. 1 unit is optional. Note Woodward governor, Nugent oil filters.





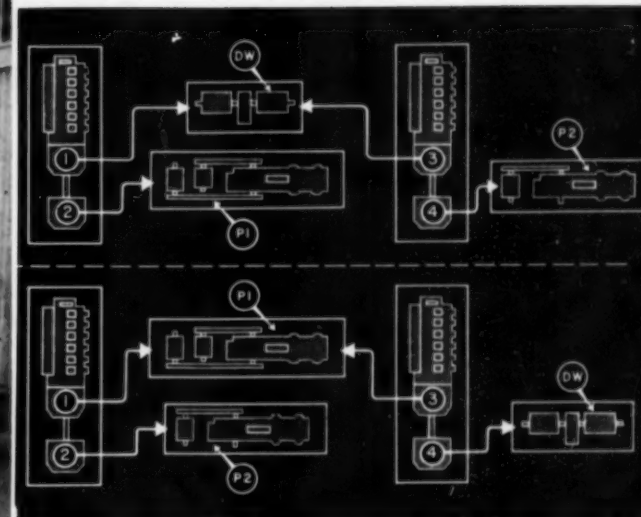
Electrical control cabinet of Bullard rig. Use of separately excited motors and differentially compounded generators simplify electrical controls.

hp at 800-900 rpm for drawworks duty and 650-800 hp at 950-1050 rpm for continuous mudpump duty. Flexible switching arrangements allow the driller to connect the generators to the motors in various ways to meet different drilling loads. For example, while hoisting and lowering the drill string, the driller can assign two generators to the drawworks drive, one each to the mudpump drive, one each to the rotary (through the drawworks) and the auxiliary mudpump.

The story of how such a source of power has evolved stretches back as far as the oil-drilling industry itself. As far back as the twenties, the internal combustion engine was seen as the most efficient source of prime power. But how to transmit this power to rig machinery was a difficult problem. Locomotive builders reasoned that the diesel engines, traction generators, and traction motors which had proven so successful in diesel-electric locomotives would form the basis for an excellent power source on drilling rigs. These components not only delivered great power at low cost but were able to withstand the severe shocks and loads and the adverse effects of the elements encountered in the hauling of heavy trains.

The first such rig sold by Alco went to the Bate-man Drilling Company in 1955. Responsible for the success of the later packages are a number of significant improvements over the early efforts. For example, the model 251 engine used by Alco burns fuel more economically than the early engines—operating on as little as 0.380 lb. per bhp-hr.

There are nine skid-mounted units in the Alco package: two engine generator sets; a dual-motor drawworks drive; a dual-motor main mudpump drive mounted with the pump; a single-motor auxiliary mudpump drive mounted with the pump; a dc electrical control cabinet; a small diesel-driven alternator for auxiliary ac; a utility unit with ac switchboard, air compressors, and several small pumps; and the fuel tank. Also part of the package are the electrical controls and instrument panel located at the driller's position. The small engine-alternator, utility unit, and fuel tank are all modifications to the basic package. During regular operation of the Bullard rig, ac current for all auxiliaries is furnished by the 150 kw alternator on one of the engine-generator units. During rig-up, however, ac comes from the auxiliary ac skid, which mounts a Caterpillar D-342

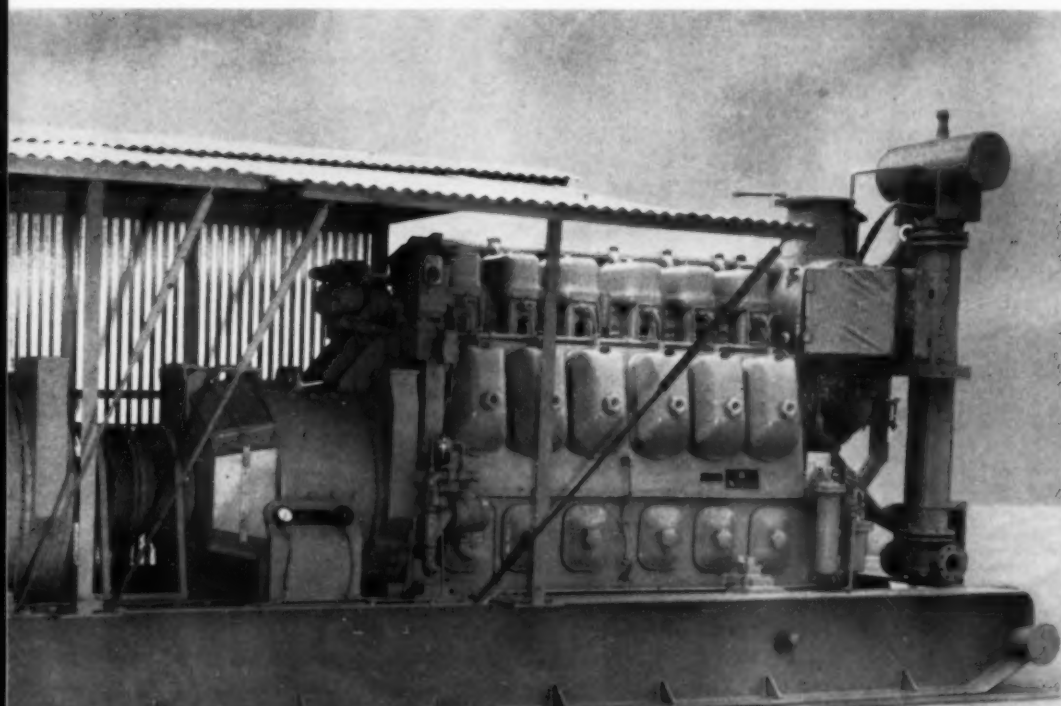
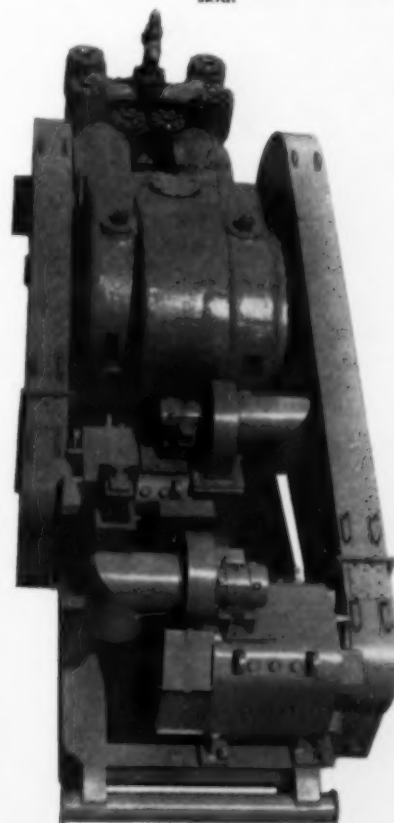


Driller can put power where needed by flipping switch. Top, for hoisting, drawworks is supplied by two generators, main and auxiliary mud pumps by one each. Lower, for drilling, two generators power main mud pumps, one the auxiliary mud pump, one the drawworks.

diesel coupled to a 100 kw alternator. This unit is not a part of the basic Alco package.

To provide the desired motor and generator performance without resorting to the complication of external limiting devices, Alco uses differentially-compounded generators and separately-excited motors. This system inherently limits the speed and torque of the drive motors to safe values, even under drastic changes in load such as sometimes occur in drilling operations.

Compactness made possible by electric drive on power package is illustrated by main mud pump unit for Bullard rig. Pump and drive are on single skid.





# TWO CATS PROTECT 50-MILLION HAMBURGERS

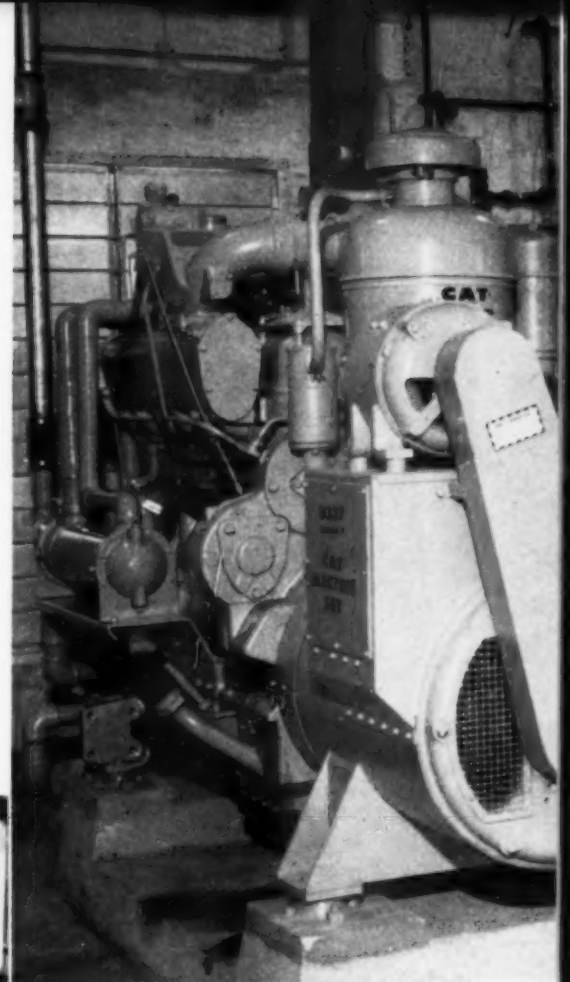
By ED DENNIS

**T**HE "hamburger that's fit for a king" has moved into a new "Royal Castle" completely protected by two "Cats". With the opening of its new commissary and general offices in Hialeah, Florida, Royal Castle Systems, Inc., created a fitting capitol for the world famous hamburger. The 420 foot by 145 foot C. B. S. structure, with some 70,000 sq. ft. of floor space, is palatial and modern in every respect. And incorporated in the plans for this new Royal Castle, the company's officials installed two emergency standby generating units. The diesels, selected by the Royal Castle engineers for this very important phase of the plants operation, were two model D337 series F turbocharged Caterpillar diesel engines.

William D. Singer, chairman of the board of Royal Castle and founder of the firm in 1938, stressed the fact that the various installations were practical as well as palatial. The gleaming white tile, plus endless feet of stainless steel motif, makes for super-sanitary operation. In addition to production facilities, the building includes modern executive offices, sales and staff conference rooms, employee training facilities plus a small theater auditorium. Mr. Singer has embarked on a Royal Castle expansion program that will make Hialeah the nerve center of a huge hamburger kingdom. Present company expansion plans call for about 200 shops in Florida. Royal Castles are also planned for the Tampa and St. Petersburg areas on Florida's west coast and south to Key West.

The two diesel generating sets supplied by Shelley Tractor & Equipment Co., of Miami, consist of two model D337 series F, six cylinder turbocharged Caterpillar diesel engines, each having a bore and stroke of  $5\frac{1}{8}$  by  $6\frac{1}{2}$  in. and a piston displacement of 805 cu. in., which drive self regulated three phase 60 cycle 120/208 volt 528 amp Caterpillar generators rated 150 kw at 1800 rpm each. Charles W. Moneypenny, commissary maintenance engineer, stated that the two standby Caterpillar generating units will supply sufficient power to keep every electrically driven piece of equipment in the commissary and warehouse running with the exception of the four large air conditioning units.

During the winter season, from early December to the end of March, when the peak load demand on the local electrical utility company is the highest, one generator is put on the line during the hours from 5 p.m. to 9 p.m., saving Royal Castle about \$200 a month during that period and helping to relieve the load pressure on the utility company. Fuel consumption is about 10 gals./hr. per unit. Lubricating oil consumption runs 1 pint per unit for a four hr. duration. Since South Florida is in a section of the country where short lived tropical storms are frequent, these "Cats" have been called upon to carry the full electrical load about three or four dozen times due to local power failure.

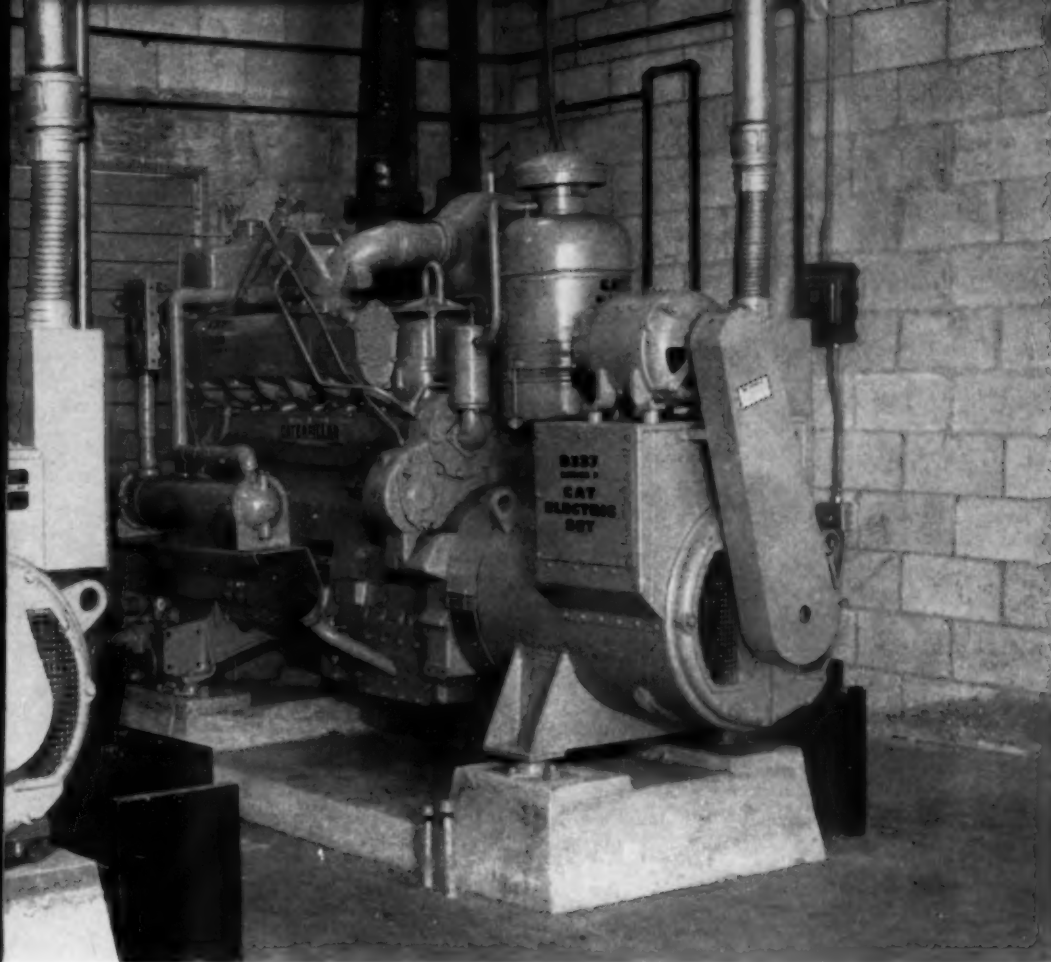


Part of the gleaming tiled cooling rooms in which 150,000 lbs. of beef can be stored at one time. These units depend on the two Caterpillar diesel generating emergency sets in case of a power failure.

The new Royal Castle commissary and general offices in Hialeah protected by two Caterpillar diesel generating sets in case of a power failure. This ultra modern commissary contains 70,000 sq. ft. of space and covers  $1\frac{1}{2}$  acres on a five acre tract.







The two D337 series F Caterpillar diesel generating sets, rated 150 kw at 1800 rpm, with 120/208 volt 3 phase 60 cycle 528 amp 187 kva Caterpillar generator. Installation also includes Young heat exchangers, Donaldson air cleaners, Trojan rectifier battery chargers.

It is predicted the meat department of the new commissary can produce 50 million hamburger patties a year and as hamburgers are the main item at the new commissary here is a brief outline on just how important the beef is and the amount of electrical motors needed to keep it fresh and on the move: In the gleaming tiled meat cooling and holding rooms 150,000 lbs. of beef can be stored at one time. Sections of beef are rolled into the plant on overhead rails and weighed on an electronic scale with the poundage stamped on a bill accompanying the beef. Then the beef moves into the cooling room and thence to the cutting and boning departments. All the loading and unloading of the food trucks is done behind closed doors protecting the beef from heat and contamination. Two 40 hp multi cylinder refrigerant units provide refrigeration for the cooling units. Some of the electric motors needed in the meat department are three 5 hp, one 7½ hp and one 3 hp electric motors.

Royal Castle's bakery department in the new building is among the most modern in existence and next in importance. All air entering the 16,000 sq. ft. shop is washed through a curtain of

A meat department innovation is a system of electronic controls for stacking and counting hamburger patties. Eight machines handle this phase of the operation. Automatic patty machines can turn out 50-million hamburger patties a year.

water. The bakery with its gleaming green tile walls is filled with electronic devices and automatic conveyors. Over 50 electric motors ranging in size from a 20 hp motor for the ready dough mixer to tiny ¼ GE induction motors on the electrically operated ovens are used in this important phase of the operation.

The bakery, once started, is a continuous operation completely automatic. It can turn out 560 hamburger buns a minute, 36,000 doughnuts a day plus other bakery products such as pies and pastries. As an example of how important these Caterpillar diesel generators are, during a recent



quick short-lived tropical storm, the local utility company suffered a power failure in this section, the diesels came on the line automatically and Chief Engineer Moneypenny shifted the load to them. However, in the few seconds interval between the power failure and when the "Cats" took over, the electric motor driven conveyor and the automatic doughnut frier went out and several dozen doughnuts burned in the hot frier grease.

Some of the additional load that these "Cats" are called on to carry are 2,432 ft. of fluorescent tubes of 74 and 39 watts plus 129 200-watt incandescent lamps and a half-dozen electric fan motors up to 1½ hp. The electrically equipped office machinery also carried by the "Cats" consists of two calculators, six typewriters, several accounting machines, eight I. B. M. machines and 15 adding machines.

For over 20 years, Royal Castle shops have never closed their doors; even during the disastrous hurricane of 1947 when almost all of South Florida was under water and flood waters were half way up the counter stools, Royal Castle shops remained open for business.

A typical Royal Castle hamburger shop. The chain operates about 60 of these shops now but company plans call for an expansion to about 200 in So. Florida.



# DEEPWATER TUG HAS RIVER TOWBOAT FEATURES

**Kort Nozzles, Twin Rudders for Astern Steering  
Control Said to Give "Startling Efficiency" to  
*Dravo Pioneer*. Power Is Supplied by 1600 shp GM  
16-567C Cleveland Diesel Engine with Wichita Air Clutch**

**A** UNIQUE 1600 hp tugboat that is expected to create new speed and safety records in ship docking and general deepwater towing work made her debut in New York harbor recently. Close kin to conventional tug design above the water line, the new vessel embodies radically different stern hull lines plus propulsion and steering features of the giant inland river towboats.

The tugboat, *Dravo Pioneer*, built by the Dravo Corp., was launched late last year at the firm's Wilmington, Del., shipyard. The new vessel is 100 ft., overall, has a 27 ft. beam, 14 ft. 6 in. molded depth and an operating draft of 12 ft. She is said to be the world's first deepwater tug equipped with a Kort nozzle for added power and twin rudders for 100 per cent astern steering control in addition to the conventional rudder for steering ahead. Dravo engineers said extensive trials have revealed a startling increase in efficiency obtained through adapting successful design features of inland towboats to a deepwater tug. One of the oldest marine towing firms on the East Coast, Dalzell Towing Co., New York, began char-

ter operation of the *Dravo Pioneer* in mid-January. After studying initial test results Briggs Dalzell, the towing company president, predicted the vessel would "revolutionize standards of tugboat efficiency and operation on the East Coast".

Designed for use in general harbor work including ship docking as well as deep water towing, the new tug is powered by a General Motors 16-567C marine diesel engine. The engine turns a 108 in. three bladed stainless steel propeller through Falk model 21MBW reverse reduction gears and a Wichita clutch with controlled slip features. Engine rating, at engine speed of 775 rpm and at a propeller speed of 202 rpm, is 1600 shp. Engine driven jacket water pumps circulate fresh water through the engine, lubricating oil coolers and raw water heat exchanger. The Kort nozzle is piped to serve as a skin cooler.

## Two Steering Systems

The *Dravo Pioneer* has two steering gear systems, one for backing and one for steering ahead. Steer-

The *Dravo Pioneer*, first tug of its type, has been chartered by Dalzell Towing Co., New York, for harbor and seagoing service.

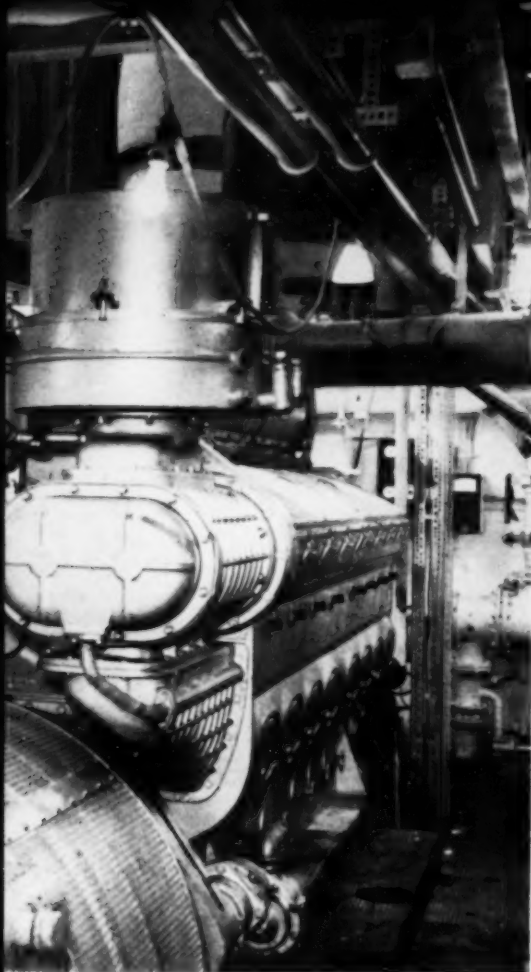
Rudders, Kort nozzle and propeller of the *Dravo Pioneer*, looking astern. Backing rudders act as guide vanes when the vessel is moving ahead, produce gains in propeller performance which offsets their drag.



Tug is powered by this GM model 16-567C marine diesel engine which produces 1600 hp at 775 engine rpm. Engine is equipped with Falk reverse reduction gear and Wichita clutch. Engine also drives 25 kw generator at upper left through v-belts. Note Air-Maze air filters.







ing engines are located below the main deck for easier clearance for hawser work. Each system consists of a double acting hydraulic ram, steering control valve and mechanical control and follow-up mechanism. Each is supplied by a common hydraulic pump; a second pump acts as a standby.

Steering is controlled from the pilothouse console and an aft console on the starboard upper deck through levers with push rods running to the steering compartment. Through the followup system, the rudders remain at the same angle as the levers in the pilothouse or aft station, giving the pilot a constant indication of rudder position. Steering ahead may also be done in the pilothouse by use of a wheel.

#### Principal Equipment Serving The Dravo Pioneer

Main engine	GM Cleveland
Air filter	Air-Maze
Air starting motor	Ingersoll-Rand
Governor	Marquette
Muffler	Maxim
Temperature regulator	Fulton Sylphon
Reduction gear	Falk
Clutch	Wichita
Propeller	Avondale
40 kw generator set	General Motors
Air compressors	Ingersoll-Rand
Fuel oil pump	Goulds
Lube oil pump	Viking
Water pumps	Fairbanks-Morse
Fresh water cooler	Ross
Lube oil cooler	Ross
Pneumatic control	Westinghouse Air Brake
Lube oil filter	Briggs
Lube oil strainer	Cuno



*Dravo Pioneer* has two sets of steering controls, a wheel for steering ahead when holding a course and separate steering levers for quick maneuvering ahead and astern. Engine is controlled by Westinghouse air brake pneumatic system.

Three streamlined, balanced rudders control the vessel's course. One is located aft of the propeller for steering ahead and two are forward of the propeller for backward control. Pitch, area and blade form of the 9 ft. propeller were designed by Dravo for use with the Dravo Kort nozzle. Just aft of the propeller is a single armed steel strut which supports the propeller shaft and is faired with the steering rudder.

#### Outpulls Conventional Tugs

With a tested bollard pull ahead of 55,000 lbs. at 1575 shp, the *Dravo Pioneer* tops a conventional tug of comparable power by 40 per cent, according to Dravo engineers. With tested bollard pull astern of 34,000 lbs. at 1525 shp the advantage is 26 per cent. At six knots towing speed the *Dravo Pioneer* advantage is 25 per cent. These gains are equivalent to adding 500 to 800 hp to the 1600 hp installed capacity.

Fuel tanks in the *Pioneer* are located forward and to either side of the machinery space. Fresh wash water is stored in a forward deep tank and drinking water is stored in independent tanks in the forecabin. Ballast tanks are located in the forepeak, under the forecabin flat, and aft of the engine room. Both hull and superstructure of the vessel are of welded steel construction. The superstructure includes the main deckhouse and pilothouse with captain's quarters just aft of the pilothouse. In the main deckhouse are quarters for a crew of 10, a galley-mess area and machinery space. The pilothouse is arranged port and starboard for complete control except for engine starting.

Electric power for 125 volt, direct current operation is supplied by two generators, one a 25 kw



Mrs. W. L. Davidson, wife of Dravo's engineering works division general sales manager, christened *Dravo Pioneer* in ceremony at Pier 1 on New York's North River.

generator belt-driven off the main engine, the other a General Motors 40 kw diesel driven auxiliary generator. Hull fittings include two 12 in. dia. double towing bitts, one fitted forward longitudinally and one fitted aft transversely. Side bitts, fitted with half cleats, are located in the bulwark forward and aft. One electrically powered single barrel raised capstan is located on the starboard quarter deck with controls at the aft steering station. The *Dravo Pioneer* is equipped with modern navigation equipment including radar, radio telephone, magnetic compass, sound powered intercom system, airhorn and hand operated bell.

The *Dravo Pioneer* was christened at Pier 1 on New York's North River on Jan. 11 by Mrs. W. L. Davidson, wife of Dravo's Engineering Works Division general sales manager. Her aide at the ceremony was Mrs. R. W. Marvin, wife of the division's general manager.

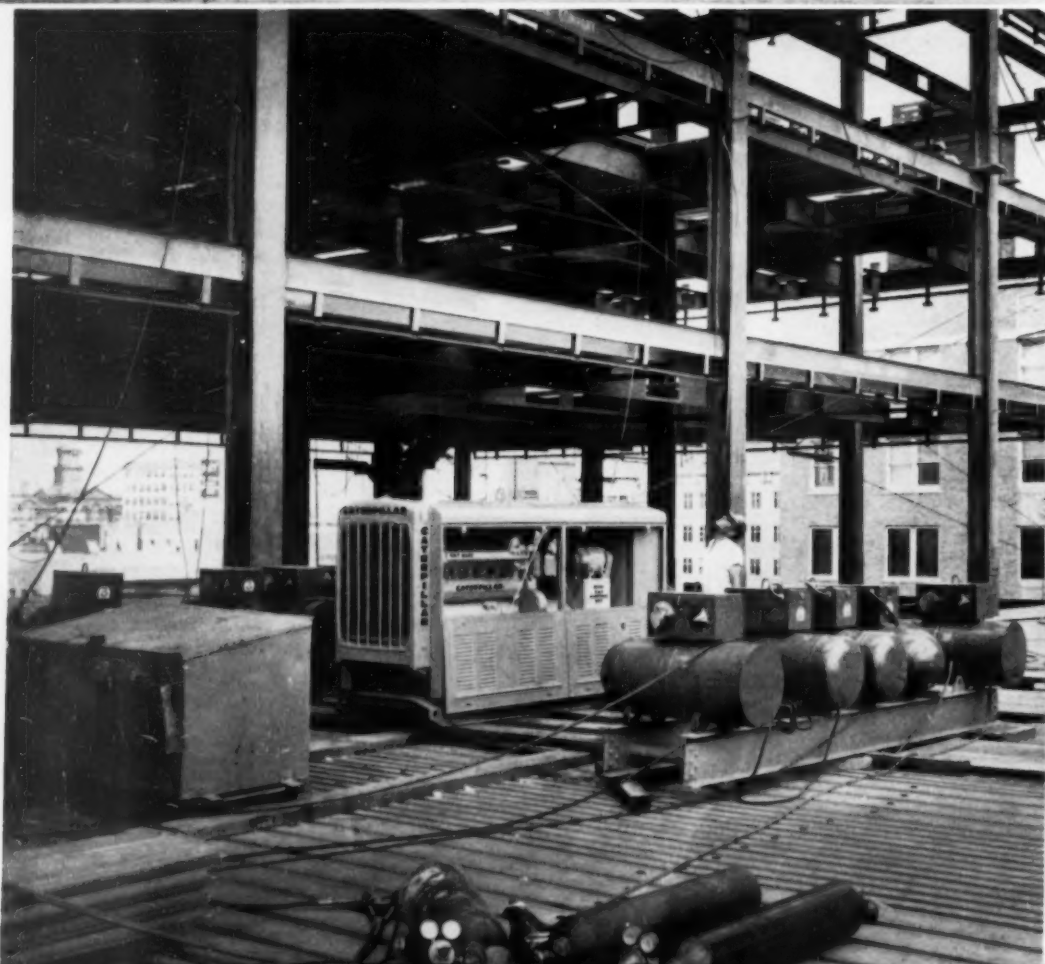


# DIESELS ON THE JOB

Here is a Picture Roundup of Diesels in Service  
Plus Some of the Latest Equipment Applications



◀ Allis-Chalmers' new TS-360 motor scraper with 30 cu. yd. heaped capacity is powered by A-C's turbo-charged 21000 diesel engine rated 340 hp at 2000 rpm. Unit is equipped with 5-speed, constant mesh, spur gear transmission; air actuated inertia brake to assist in upshifting. Kon-Tork differential controls amount of torque delivered to each drive wheel in relation to traction requirements.



◀ Versatility of diesel electric power is illustrated by this use of a Cat D337-F electric set by F. B. McIntire Construction Co. in erecting 20-story First National Bank building in Ft. Worth. Set furnished power for fifteen 300 amp Lincoln welders, replaced more expensive short-time tie-ins to municipal power source.





Fifteen International model 95 Payhauler rear-dump trucks help move up to 20,000 cu. yd. of earth per day on construction of Interstate 1-94 in Hunterdon County, N.J., where Yonkers Construction Co. is moving 3,600,000 cu. yds. of material. Model 95 Payhauler is equipped with International's DT-817 turbocharged diesel engine rated 375 hp at 2100 rpm. Firm is also using 14 International TD-24 tractors on the project.



Blue Bell, Greensboro, N.C., makers of work and play clothing recently purchased fleet of 18 Diamond T tilt-cab diesel tractors. Model 921CN units are equipped with Cummins NH-220 diesel engines, Fuller R96 RoadRanger transmissions, Timken R140 rear axles, Spicer 14 in., 2 plate clutches and Luberfiner 750 oil filters. User reports average fuel mileage of 6.5 mpg with average gcw of 60,000 lbs.

50 years of rail progress is represented by Alco Products, Inc. display at Schenectady County Sesquicentennial. Included are No. 999, steam locomotive which set 112.5 mph record on Empire State Express run in 1893, Alco lightweight export road switcher and "World" 1950 hp unit.



This stern-wheeler is the joy of Marion Fowler, Austin, Tex., attorney, who had riverboat built in 1949. The *Commodore* is equipped with GM model 4-71 diesel engine which recently replaced gasoline unit. The pleasure boat draws 18 in., of water, travels 10 mph on Lake Austin and Colorado river near Austin. Four rudders help steer the craft.



GM 3-71 diesel engine powers new Massey-Ferguson MF-98 heavy duty farm tractor just introduced. Unit is largest in Massey-Ferguson line, develops 88 hp on the belt, 81 hp on the drawbar. Tractor has dry type, single plate 14 in. clutch; sliding gear, dual range transmission with six forward and two reverse speeds. Field operating weight up to 14,000 lbs. gives good traction for pulling most large implements.





# ELECTRICAL EQUIPMENT FOR HIGH DUTY TRUCKING

By ROBERT E. SCHULZ

**D**O highway fleet operators need engine electrical equipment that will match the overhaul life of diesels, transmissions and other drive components in high speed, continuous freight service—service that demands the greatest possible vehicle availability? It takes more than a simple "yes" to answer this question based on talks I've had with fleet maintenance supervisors around the country. Many operators are daily faced with vehicle downtime due to electrical equipment failures so the economics of longer life equipment is a paramount consideration. Because of this, most of the larger OTR fleet operators are more than ready to work with the manufacturers in developing longer life truck electrical equipment.

Over the last several years, with the cooperation of many major truckers, Delco-Remy has engineered, tested, and is now in active production of a completely new line of "high duty" electrical equipment—starting motors, generators, regulators and batteries—for the trucking industry. High-duty application, Delco-Remy officials are quick to add, should not be confused with "heavy-duty". Only one-third of the heavy-duty trucks are called upon to operate in the one to two hundred thousand mile or more bracket per year—the service for which this new high-duty equipment is specifically tailored. The new line, informally introduced in Detroit when the Regular Common Carriers Conference was holding its annual meeting, consists of 12 volt generators, both dc and self-rectifying ac types; 12 volt full transistor regulators; and totally enclosed 12 volt cranking motors. Less expensive transistorized regulators, not yet proved capable of the same period of service, also were discussed.

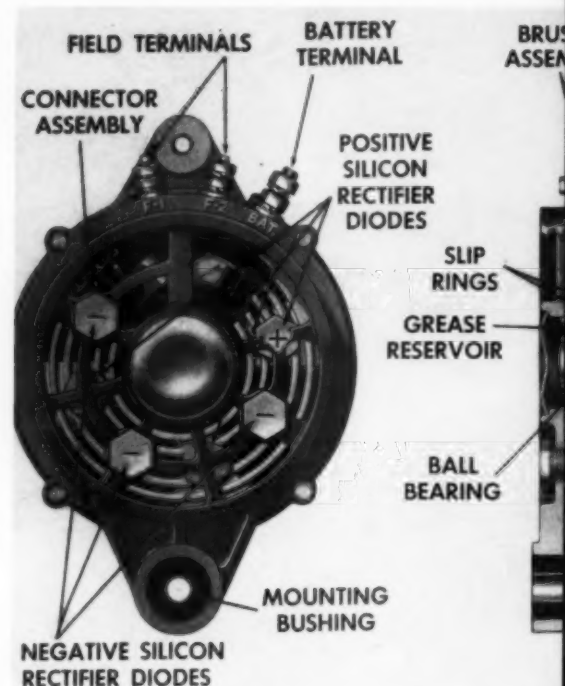
In designing the new high-duty dc generators, the engineers looked at the two parts most subject to wear—the brushes and bearings—and used these as a focal point in their development work. To reach the goal of 250,000 miles without maintenance, each bearing was designed with a reservoir of grease next to it, a much larger supply than could be contained in the bearing itself. Use of this construction eliminates periodic oiling or turning down grease cups, as well as the possibility of introducing dirt into the bearings along with the lubricant. It also permits the generator to be mounted in any position without regard for the grease cups or oilers. To attain greater brush life, the wear length of the brush was doubled compared to the standard 50 amp dc generator and the spring changed to a constant tension type so that optimum pressure would be maintained on the brush throughout its life.

Another enemy of long life in a generator is the failure of the armature insulation through operation at high temperature over a prolonged time.

In contrast to the older style Delco-Remy armature wound with cotton covered wire, the new one has an improved film-type insulation without the cotton covering. With much more rapid transfer of heat from the wire to the air, this armature operates at a much lower temperature. Connecting the wires of the newer armature to the commutator by a spot welding process instead of soldering adds to its reliability.

To eliminate the problem of thru-bolt breakage caused by high torsional vibrations, Delco-Remy engineers have incorporated a vibration damper in all of their high-duty generators. The damper is a cone-shaped piece of phenolic laminate through which the thru-bolt passes.

The new dc generator is available in 5 $\frac{3}{4}$  in. and 5 $\frac{1}{4}$  in. frame sizes as well as in 12, 24 and 32-volt models. At Delco-Remy, the design emphasis is on 12-volt systems which its engineers believe will be standard in the next few years. Consequently work in the ac generators, regulators and starting motors have followed this line of development. Two 12 volt, self-rectifying ac generators have been produced which, in addition to their high-duty service, produce a charge at idle. The latter feature is one expressly developed for operators of large continuous service units where up to 27 amps available at idle speed is required. Taking a look at the first of these generators, the model 1117070 has a 5 $\frac{3}{4}$  in. frame diameter with the same mounting lug spacing as the 4 $\frac{3}{8}$  in. frame diameter dc standard type generators. (Adapting brackets are available if necessary where it replaces 5 $\frac{3}{4}$  in. frame diameter truck type generators.) It produces 27 amps at normal idle, 60 amps max. output, with safe operation up to 12,000 rpm pulley speed. For some of the double-bottoms used on the Thruways,

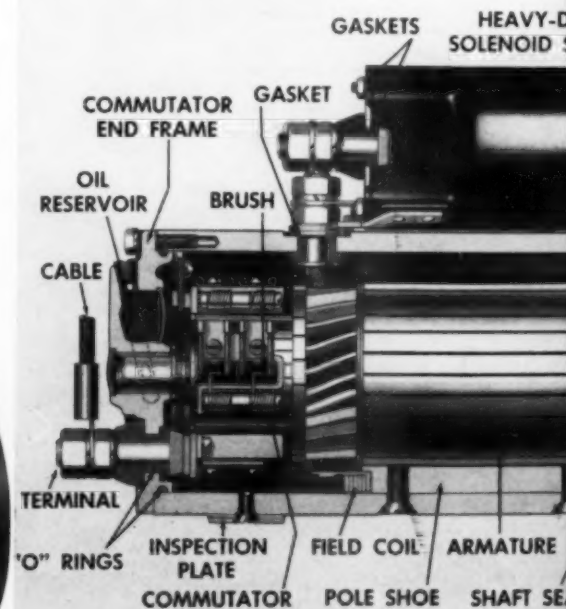
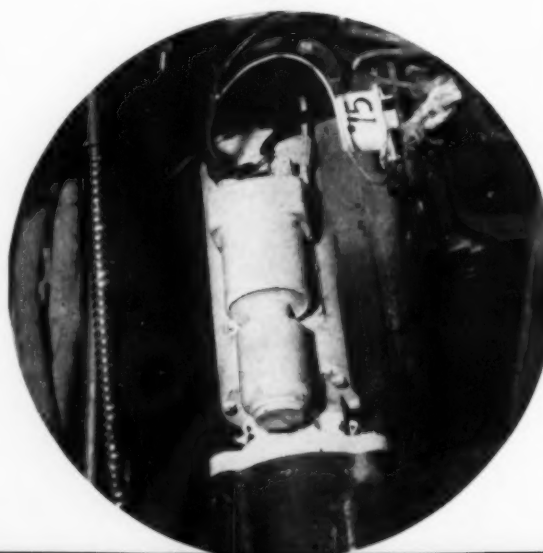


it can be modified to have an output in excess of 80 amps. The extra-heavy duty model 1117115 generator permits the use of electrical accessories which could not be used with ordinary generators. It has a 105 amp output max. with 23 amp available at the 1100 rpm attained at engine idle speed. Frame diameter is 6 $\frac{1}{8}$  in. Both of these generators differ from the conventional ac types in their self-rectifying features. In addition, the model 1117070 has no external ac output terminals. Six specially developed silicon diodes built into the slip ring end frame rectify the three phase ac voltage to produce dc at the battery terminal of the generator, eliminating the need for an external rectifier, etc. The construction features are pointed out in the illustration. With the high duty ac design, two brushes ride on each of two slip rings in contrast to the conventional commutator.

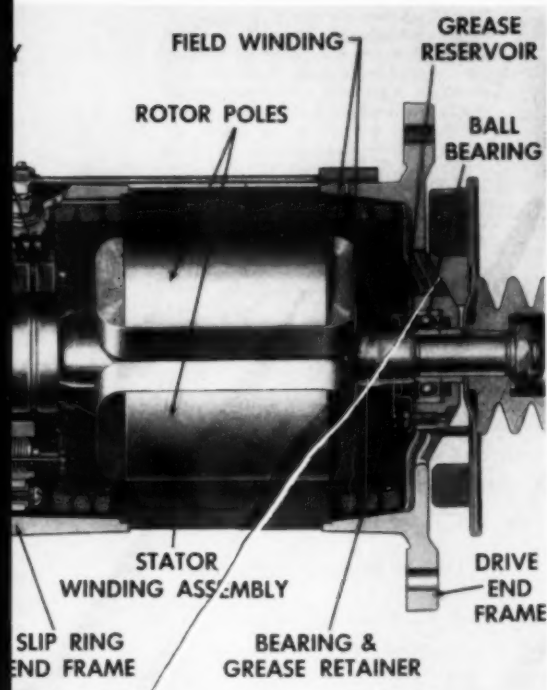
The brushes, springs, bearings, etc. in these gen-

Cross section of totally-enclosed, 12 volt starting motor with sprag clutch drive. Housing are available in S.A.E. #2 and 3 mountings.

Delco-Remy's new cranking motor installed on Cummins diesel operated by Denver-Chicago.







erators have the same construction characteristics as designed into the high-duty dc generators previously described.

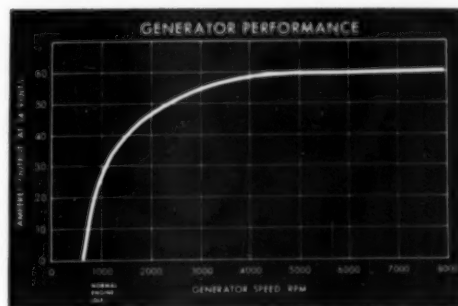
The regulators for the new ac generators are of the semi-conductor type and have several important features. Common to both the transistorized and full transistor types as well as to the 12 volt dc double contact regulator is an external adjustment feature which permits quick, easy tailoring of system voltage to meet specific battery needs. The regulator is set at the factory to the voltage best suited for average application. If, because of operating conditions, climate, etc., it becomes necessary to raise or lower the setting, this can be done simply by moving a screw to one of four other holes marked to increase or decrease voltage .3 or .6 volt.

In the 12 volt ac transistorized regulator, the transistor handles the high field current which gives



Modified 12 volt, 60 amp self-rectifying generator designed to provide 27 amp output at idle. It has same mounting lug spacing as standard duty dc generators.

Cross section of the Delco-Remy self-rectifying ac generator. Six silicon diodes are built into slip ring end frame.



Output curve of 12 volt high duty alternator model 1117070.

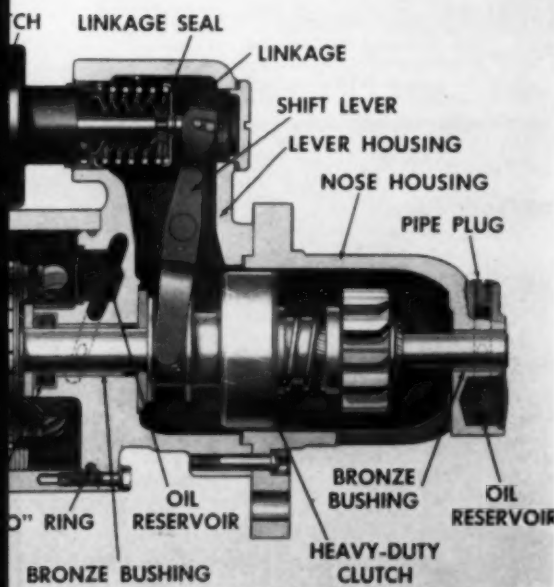
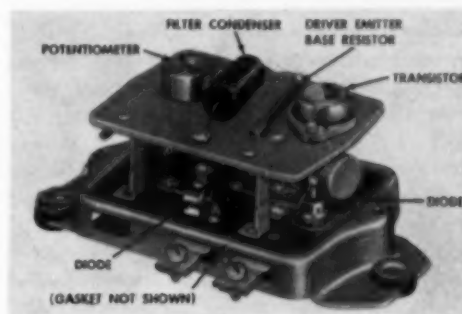
high performance from the generator but the field current does not pass through the contact points. The vibrating contacts control only the base current of the transistor, which is a fraction of an ampere. Thus a high field current is maintained with low point current, practically eliminating contact pitting and burning. These regulators fit all standard mountings and are available as either three or four terminal units.

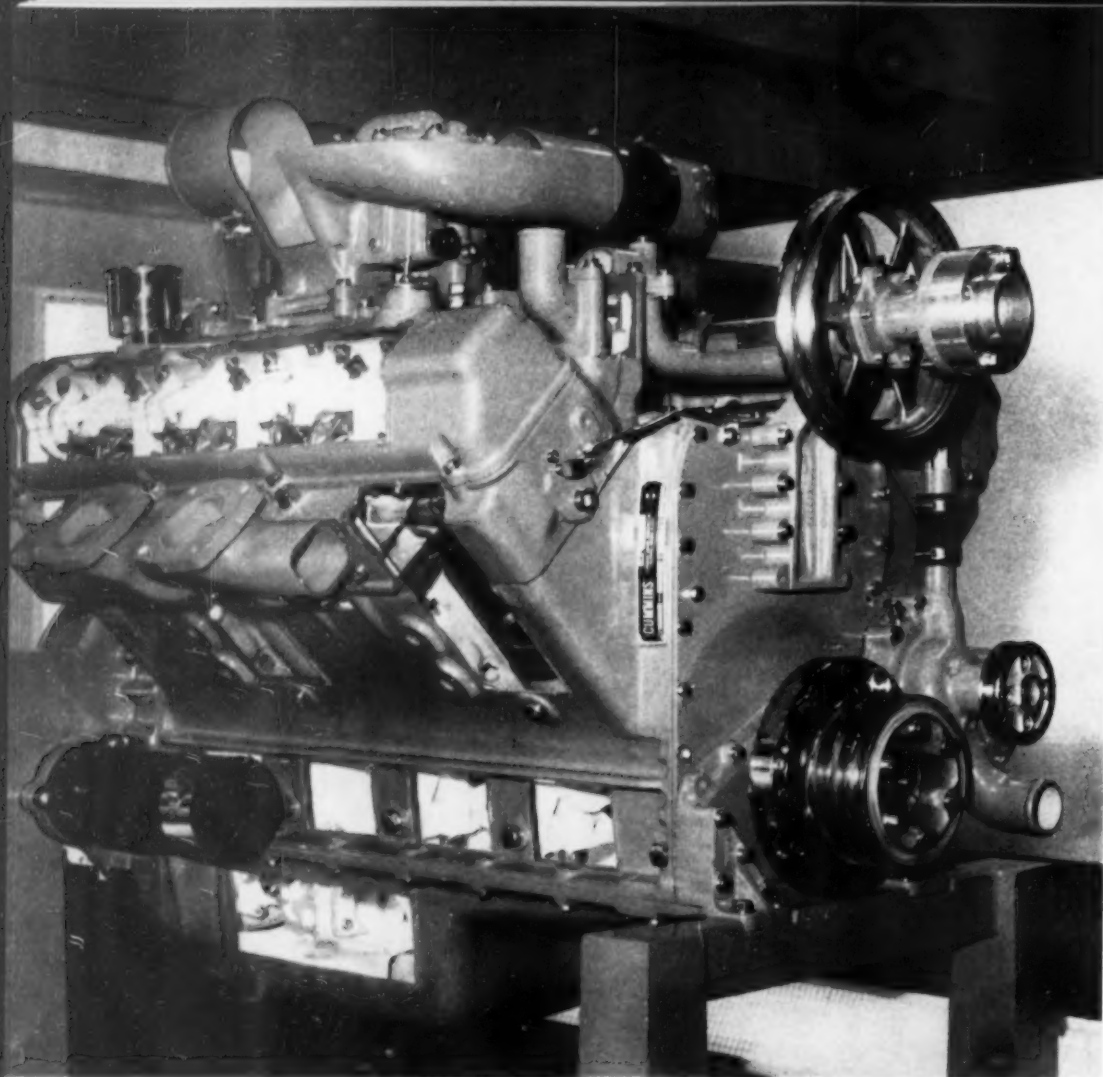
The 12 volt full transistor regulator is recommended for high-duty service. It is a completely static unit composed of transistors, diodes, condensers and resistors which produces more accurate voltage regulation—a distinct aid in prolonging battery life. According to Delco-Remy, mounting position and vibration have no effect on its operation, nor do temperature, humidity, etc. Both of the semiconductor regulators are intended for use with the ac generators only and are not satisfactory for use with a dc generator since they do not contain a current regulator or a cut out relay. All Delco Remy ac generators have built-in current regulation, which eliminates the need for an external current regulating unit, and the silicon diodes eliminate the need for a cut out relay. The transistorized voltage regulators and the standard type ac generators are available in several ratings for both positive and negative ground installations. The full transistor regulator is now in production primarily for negative grounding systems. If it is desired to install a full transistor

regulator in a positive ground system, a negative ground regulator can be used if it is insulated from the truck chassis; or a less-common and more expensive ground regulator can be obtained.

The 12 volt totally enclosed starting motor, illustrated both in application and cross section, was produced not only for long life but to reduce and simplify the inventory of service parts required. This new cranking motor has the advantage of eliminating the series-parallel 12-24 volt electrical system widely used where 24 volt starting motors are employed. The 12 volt starting motor gives high output with satisfactory cranking performance when compared with a 24 volt motor and features the advantage of having the entire electrical system 12 volt. It also eliminates the series-parallel switch and other parts which have proved troublesome in 12-24 volt arrangement from a maintenance standpoint primarily because of complications of the system. The 12 volt motor is designed to bring it up to cranking performance comparable to a 24 volt starting motor through use of such components as high copper content brushes. Necessary electrical requirements were built into the same size package as the 24 volt motor previously required. To obtain comparable performance, the same battery capacity as used on 24 volts must be connected in parallel for 12 volt operation. The current draw per battery remains the same as for 24 volt cranking but the total motor current will increase. Larger battery cables will be required depending on their length and circuit arrangement. In its design, Delco-Remy engineers have gone to a sprag clutch drive that can be used with a non-chamfered ring gear. The drive is of the positive engagement type, i.e. it is shifted into engagement by mechanical means and the lever movement is restricted by the stack-up of the clutch assembly so that the solenoid switch does not close until the pinion teeth are definitely in mesh with the ring gear. With an overrunning feature and solenoid-powered engagement the drive pinion can be kept in engagement safely until the driver is assured the engine is running. Total sealing of the motor and solenoid switch plus longer life brushes, bearing oil reservoirs, heavy cover and inspection plates, etc., give the unit the protection required to match engine overhaul life. The two part drive housing gives wide flexibility of mounting. The lever housing can be mounted in 12 different positions while a second lever housing, offset 15 degrees, can be substituted to give another 12 positions.

Delco-Remy full transistor voltage regulator has no moving parts. External adjustment feature permits easy voltage tailoring—normal to  $-.6$  and normal to  $+.6$ —for varying operating conditions.





## CUMMINS INTRODUCES A NEW HEAVY DUTY V-8 DIESEL

**Here is a Report on An All-New High Speed Diesel Engine  
Which Is Slated for Varied Applications and Is Available  
as 430 HP Turbocharged Model or 350 HP  
Naturally Aspirated Unit**

*By* BRUCE W. WADMAN

**C**OLUMBUS, Indiana, Feb. 19, 1960—Today, Cummins Engine Company officials unveiled their new V-8 high speed diesel, which has been under intensive development for several years. This engine is all new from the ground up and boasts many unique design features. It is slated for high production and wide application in such areas as construction and mining equipment, large trucks, oilfields, marine, generator sets, etc.

This eight cylinder, V-type four cycle diesel is available in two models, the naturally aspirated V8-350 and the turbocharged VT8-430. The engines are rated at 350 hp and 430 hp respectively and operate at a maximum rotative speed of 2500 rpm. Piston displacement of each engine is 950

cu. in. With a  $5\frac{1}{2}$  in. bore and only 5 in. stroke, the engine is oversquare.

Several major design characteristics stand out in the engine, and they are as follows:

1. A wide 90 degree angle between the cylinder banks coupled with oversquare bore and stroke and generous piston displacement to give high output in a short, compact package yet retain rugged long life features.
2. The engine from its original concept was designed to be a turbocharged diesel.
3. Special attention was given to engineering various parts of the engine to achieve great accessibility and a minimum in maintenance, pri-

Partial cutaway view of the new Cummins naturally aspirated V-8 diesel which develops 350 hp at 2500 rpm. This engine has a bore of  $5\frac{1}{2}$  in. and stroke of 5 in. with a displacement of 950 cu. in. It is a 90 degree vee.

marily from the aspect of ease in removing and installing key engine parts like fuel injectors, etc.

To cover these areas in detail we will first take a look at the engine performance. The 350 and 430 hp ratings at 2500 rpm fit into a very important current and future demand area particularly in such equipment as scrapers, rubber tired front end loaders and dozers, rear and bottom dump off-highway trucks, etc. The 2500 rpm feature will make it easier to apply with torque converters and power shift transmissions in these higher horsepower vehicular installations.

### Lower Weight/HP Ratio

Concerning the important weight/hp aspect, the naturally aspirated V8-350 weighs 2940 lbs. or 8.4 lbs./hp with standard accessories. This compares to 11 lbs./hp for present Cummins naturally aspirated in-line engines. The turbocharged VT8-430 weighs 2970 lbs., or 6.9 lbs./hp with standard accessories. This compares with 7.4 lbs./hp for present turbocharged Cummins in-line engines. Coupled with these lower weight/hp ratios, the V-8 engine is 55.69 in. long. For comparison purposes, the six cylinder NH220 is 60.38 ins. long (fan-to-flywheel). Shorter length is particularly important in such equipment as scrapers where front overhang is critical.

With 950 cu. in. displacement and the short stroke in relation to bore, the engine is able to produce its horsepower at a conservative piston speed of 2150 ft./min. which is at or below the piston speed of long life Cummins engines like the NH series. The bmep rating of the naturally aspirated V-8 engine is 117 #/in.<sup>2</sup> and the turbocharged engine has a bmep of 143 #/in.<sup>2</sup> These are also equal to or below the bmep ratings of the NH series Cum-

C. R. Boll, left, vice-president, sales, Cummins Engine Co., shows the VT8-430 at the Cummins preview. Among those shown are, from right, W. A. Pierce, Cummins' field application engineer; Bruce W. Wadman, executive vice president, Diesel and Gas Engine Progress and N. M. Reiners, vice-president, research, Cummins Engine Co.

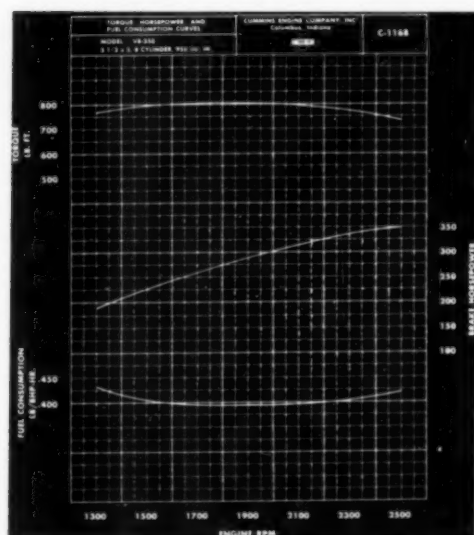




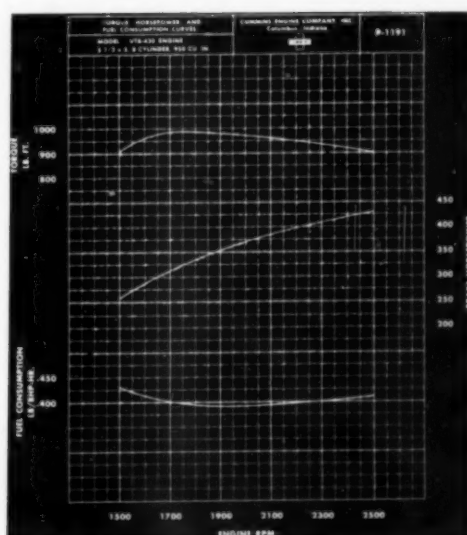
The new Cummins V-8 turbocharged engine, which develops 430 hp at 2500 rpm. Note accessories located in the vee for easy accessibility. Also note the rigid turbocharger installation. Accessory gear train is at flywheel end of engine for maximum convenience and only cooling fan and water pump drive are at front of engine. Note Schwitzer vibration damper.

mins engines. The accompanying fuel consumption curves also show that the engine is in the good performance area of below .40 lbs./bhp throughout most of the normal operating range. The 90 degree angle of the vee is advantageous, according to Cummins engineers, in providing for a good balance of stress loadings in an engine.

Passing on to the turbocharging features, it is significant that this engine from the first line on the drawing board was designed to be turbocharged. What Cummins engineers have learned from wide field experience on previous turbocharged engines in such areas, for example, as acceptable bearing loads to maintain satisfactory field service life, and design of manifolding of intake and exhaust passages to facilitate the best installation of turbochargers, etc. were all closely considered for this new engine. The turbocharger sits rigidly on top in the vee and has a short connection from the engine exhaust manifold to the turbocharger turbine inlet. This is advantageous



Performance curve of naturally aspirated V8-350



Performance curve of turbocharged VT8-430

a screen around the fuel inlet of each injector to provide maximum safety in trapping particles that may be in the passage. As the V-8 engine has one cylinder head for each bank, there is need for only a connection into the head for fuel inlet and at the other end of the head for overflow fuel return to the fuel tank. The Cummins PT fuel pump and system is used on the engine.

### New Injector Design

The new Cummins injector includes the same basic operating principles as previous injectors except that the fuel is fed to the injector through internal passages in the cylinder head. The fuel which previously entered the top of the injector through a flange with inlet and outlet passages now enters the middle of the injector, passes through a feed orifice and enters the injector cup for delivery to the cylinder. The diameter of the orifice, together with the length of time the injector plunger permits the feed orifice to remain open determines the quantity of fuel delivered to the engine cylinder. When the plunger of the injector is closed fuel passes on through the injector to the internal drain passage in the head.

All lubricating oil lines are drilled passages in the cylinder block also, eliminating the need for external lines. Full pressure lubrication to all bearing surfaces is furnished by a gear pump located in the lower crankcase. Such accessories as fuel pump, air compressor, lube oil filter, fuel oil filter and generator are located on top in the roomy vee for easy accessibility.

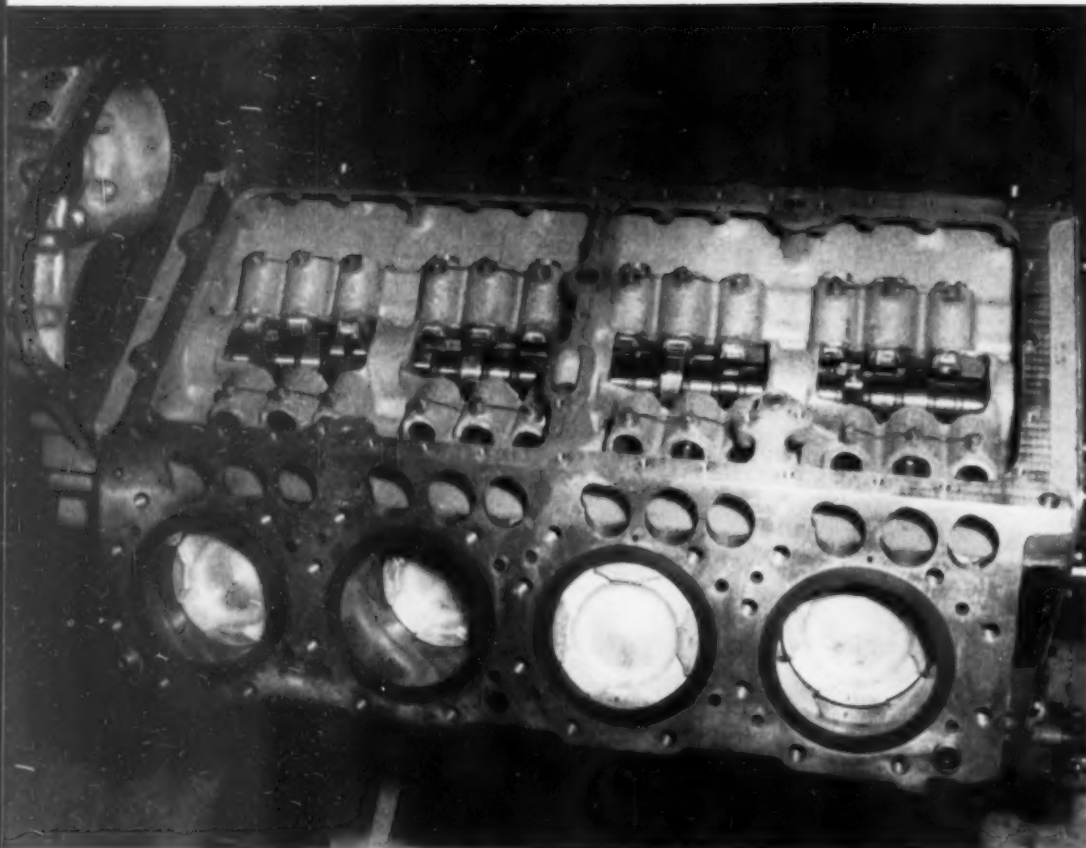
A single camshaft, carried in the vee, serves both banks of cylinders. The camshaft is gear driven by the crankshaft at the flywheel end of the engine



in providing a well sealed vibration resistant installation. A Marman aircraft type coupling is used to connect the exhaust manifold to turbocharger turbine inlet, and each bank of four cylinders feeds into the turbocharger from a separate manifold, one on each side of the turbocharger.

In the area of accessibility and maintenance ease there are a number of interesting new features incorporated in the engine. Instead of outside fuel lines, there are drilled passages through the cylinder head to carry fuel to the fuel injectors. This system also eliminates the need for screw thread connections to the injector. This means, therefore, that the injector can be removed easily by just taking off the hold down clamp. The injector is sealed by "O" rings with the fuel passage. There is





This view shows well the piston crown shape and the camshaft arrangement in the vee. Note the compact and short pushrod mechanism for the valves and fuel injectors. Also note gear drive for camshaft at rear of engine. Accessories drive off this gear.

and the accessory gear train is driven off the camshaft gear. By having the accessory gear train drive at the rear of the engine, stress is reduced and gear wear minimized. In addition, it provides for very convenient accessory attachments. The only accessory drives at the front of the engine are the cooling fan drive and water pump drive, which are

both belt driven off the front of the crankshaft. For flexibility in application, the exhaust manifolds on naturally aspirated engines can be placed either on the outside or inside of the vee as required by the installation.

Other major construction and design features of the engine are as follows:

1. Combustion chamber area: The normal Cummins open type combustion chamber is used, with two intake and two exhaust valves per cyl-

inder for maximum fuel economy. The exhaust valves are stellite and stellite valve seat inserts are also standard. Cylinder liners are of the heavy duty wet type, similar to those used in other Cummins diesels.

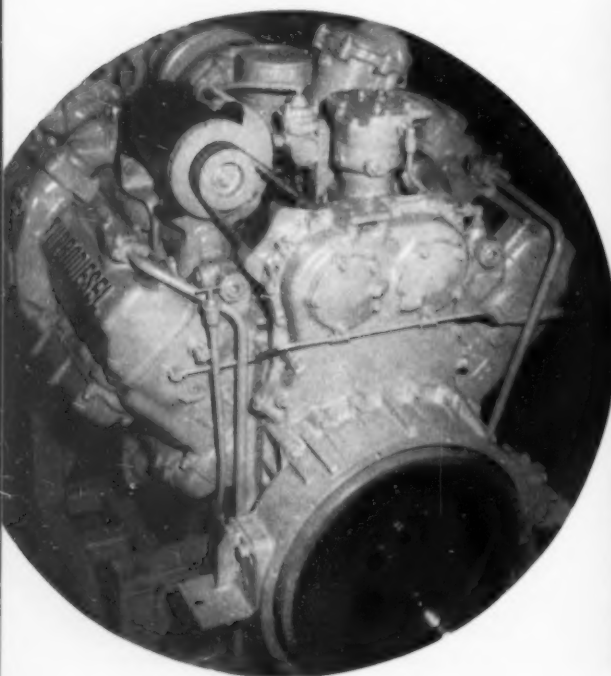
2. The cylinder block and heads are made of cast iron with low stressed items such as oil pans, air manifolds, etc., made of aluminum. The block features tie bolts from the sides as well as from the bottom in the crankshaft area to assure maximum rigidity in the crankshaft carrying section of the block. The single camshaft has short, compact push rods for the valves and fuel injectors.

3. The crankshaft is carried in five main bearings and has a Schwitzer vibration damper installed in the front. Connecting rods are mounted side by side on the crankshaft for opposite cylinders in each bank of the vee.

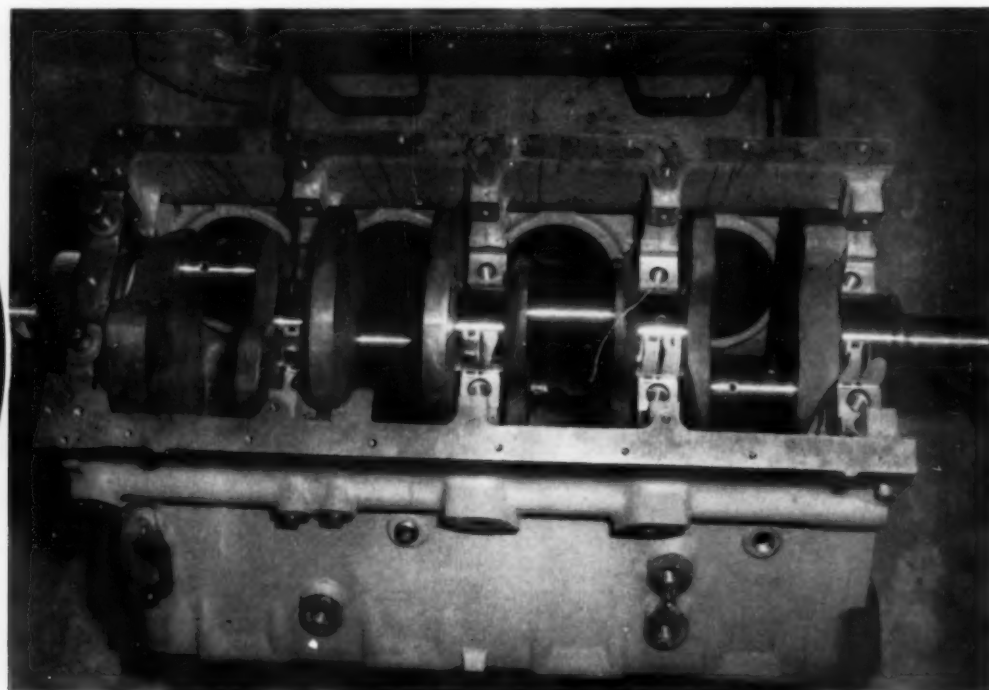
4. The cooling water pump is of the centrifugal type and there is one thermostatic control for each bank of cylinders. A shell and tube type lube oil cooler is mounted on the side of the engine.

Besides the applications mentioned previously, the new V-8 engines are well suited for hoists, shovels, rock crushers, heavy duty highway trucks such as the special thruway units, logging equipment such as yarders and loaders, and a variety of oilfield and marine equipment.

Flywheel end of the turbocharged engine showing accessory gear drive train with plenty of access for takeoff drives.



Crankshaft installation in the cylinder block. Connecting rods for opposite cylinders are carried side by side on crankshaft.



# DIESEL SETS GIVE "LIFT" TO SKIERS

**Lake Louise-Whitehorn  
Ski Lift Depends on  
Power Supplied by  
Two Generator Sets**

By JOHN S. PEACH

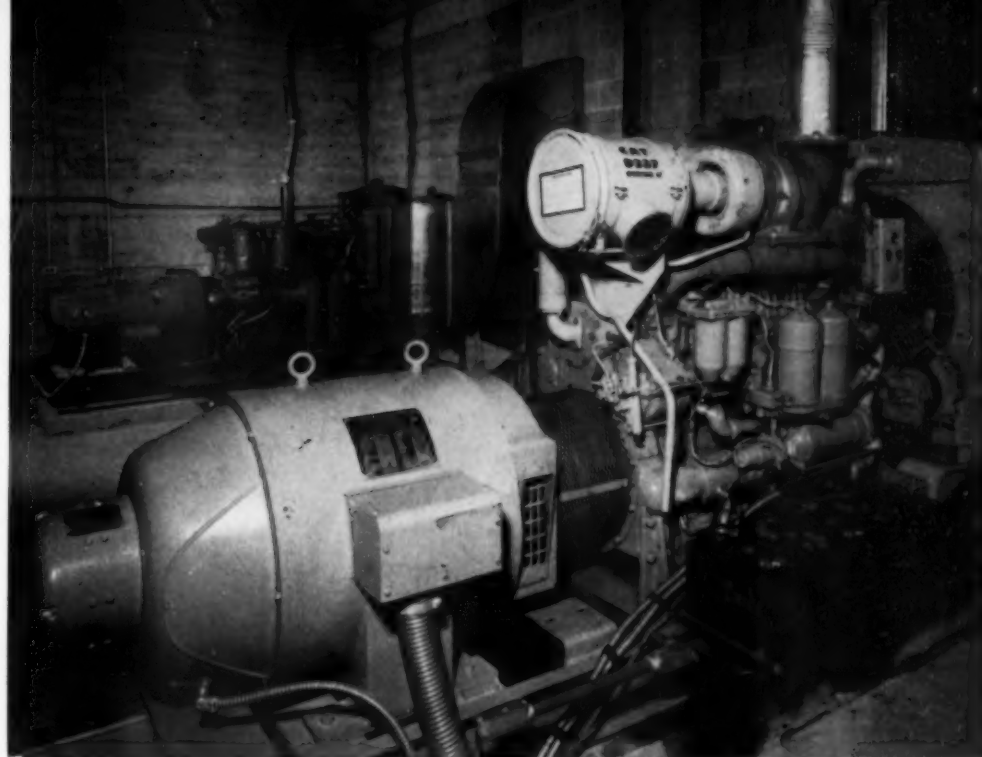
**T**HE age-old forested silence of Mount Whitehorn in Alberta, Canada has been broken by the throaty roar of powerful diesels. High on the southwest slope of the snow-capped peak, at the 6,755 ft. level, Caterpillar and Cummins diesel-generator sets stand side-by-side in a new concrete and glass terminal of the world's longest continuous passenger lift, known as the Lake Louise-Whitehorn Sedan Lift.

Long the haunt of skiers who threaded their way along a tortuous forestry trail to reach the broad swooping slopes of the Ptarmigan Valley, Skoki, and Temple beyond Mount Whitehorn. This year, however, for the first time, skiers in pairs board one of the 88 brilliantly-colored sedans for a bird-like soaring trip above three-top level for over two mi. to the upper terminal of the lift. The trip begins at the floor of the Bow River Valley opposite the world-famous Rocky Mountain summer resort of Lake Louise. There, in a concrete and native stone building, the droplet-like steel and tinted glass sedans are marshalled for the journey up Mount Whitehorn.

Travelling along a 22,000 ft. steel cable, the sedans which are capable of carrying 450 passengers hourly, silently glide upwards over virgin forest, borne by 33 forest-green steel towers on which all pulley drives and tension shafts are sheathed in nylon and rubber. Tension on the cable is maintained by a seven and a half ton counterweight in the lower station housed in a shaft 60 ft. deep and 10 ft. square. At the upper station is the other turn-around and marshalling point within the two-story terminal on the lower floor of which is the power room with its two diesels and electrical switch gear.

The main power plant is a Caterpillar D337H diesel engine, a 6 cylinder, turbocharged unit developing 310 hp at 1800 rpm, with bore of 5 $\frac{1}{4}$  in. and stroke of 6 $\frac{1}{2}$  in. The engine is coupled to a 440 volt, 187 kva generator with a 50 volt, 50 amp exciter, driving the generator at 1800 rpm with speed governed by a mechanical flyball governor. The final drive from the power plant to the upper terminal turntable is through an electric clutch.

The auxiliary power unit is a Cummins H-6-I diesel with a cont. rating of 110 hp at the 1200 rpm governed speed. The H-6-I is a six cylinder engine



A Caterpillar D337H and a Cummins H-6-I furnish power for the Lake Louise-Whitehorn ski lift. Cat drives a Houchin generator, Electric Machinery generator is driven by the Cummins engine.

One of the 88 sedans on the lift nears the upper terminus. Spread below is the valley of the Bow River, with Sawtooth range rising beyond it.

with bore and stroke of 4 $\frac{7}{8}$ x6 ins. It is directly coupled to an Electric Machinery 440 volt, 62.5 kva generator and 125 volt, 12 amp exciter. Starting on both engines is by battery operated starting motors and both engines are water cooled; air from the Cat radiator fans is carried out of the building through louvres and through ductwork in the case of the Cummins unit. Electrical switch gear was designed by Electric Power Equipment Ltd., of Vancouver B.C. who made the overall installation under the direction of the resident engineer J. G. MacDowell of Lake Louise Lifts Ltd.

In time, the upper terminal will become a mid-way point, for the second stage of the sedan lift—still in the planning stage—calls for a further stage to the 8,600 ft. level of Mount Whitehorn. When this is accomplished, the completed chain of lifts will provide access to a full day's (30 mi.) downhill skiing comparable to that offered in the Swiss Alps, and adequate for Winter Olympic downhill races.

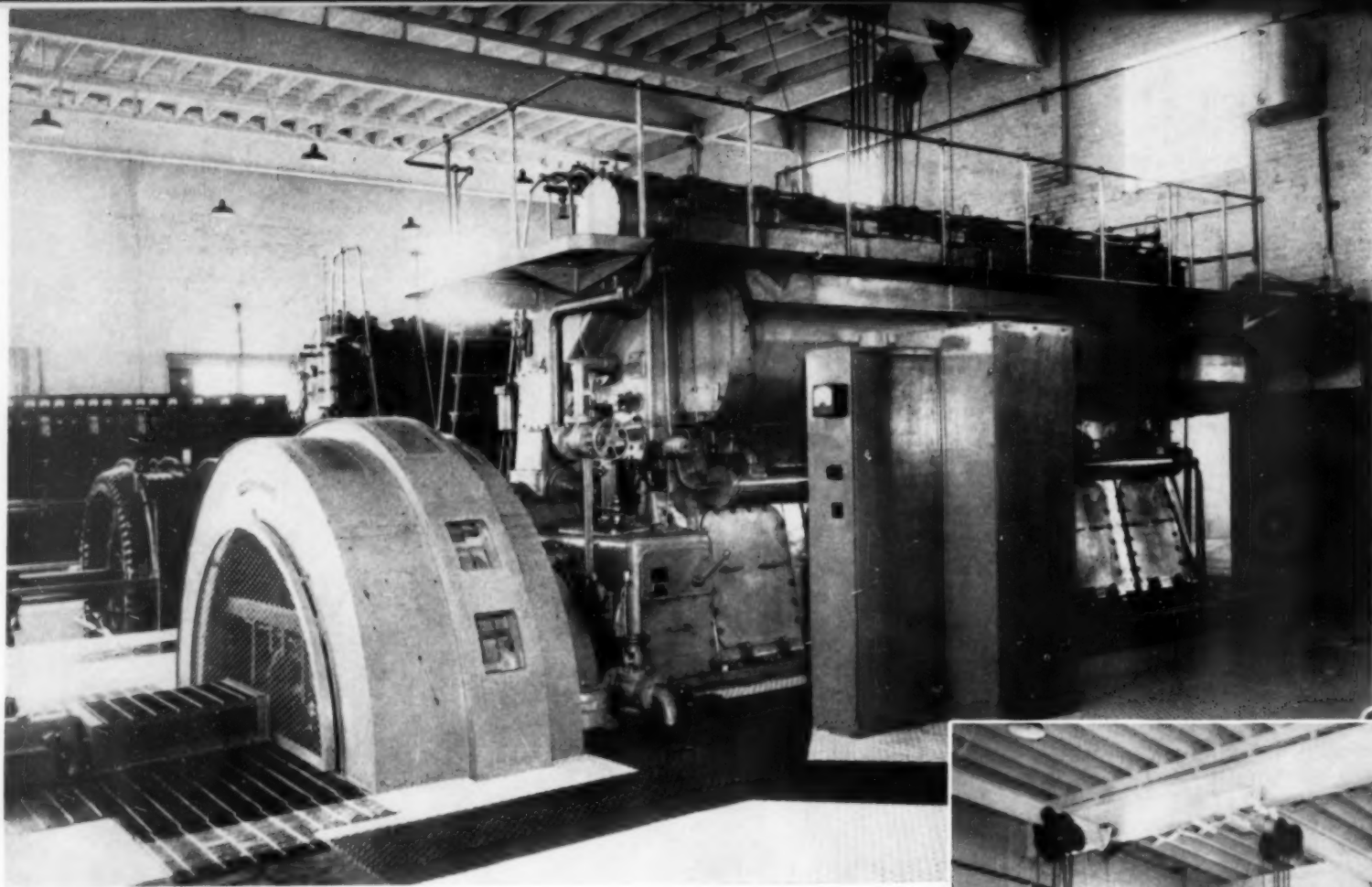
## Principal Equipment Lake Louise Ski Lift

Main engine	Caterpillar
Air filter	Purolator
Auxiliary engine	Cummins
Auxiliary generator	Electric Machinery
Air intake filter	Donaldson
Fuel oil filters	CFC Fullflo & Cuno
Lube oil	Essolube
Fuel oil	Texaco
Starter motors	Delco-Remy

Out and down from the upper terminal of the lift. Across the Bow River in center of photo is Lake Louise nestling at foot of Victoria Glacier.







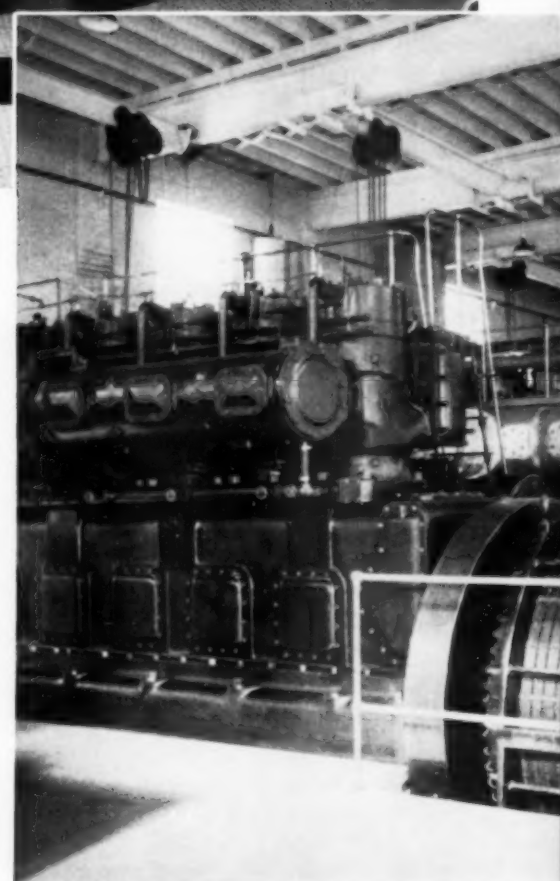
## SABETHA DIESEL CUTS COSTS

**T**HE Sabetha, Kans., municipal power plant has a long record of economical diesel operation and has rates among the lowest in the state. Since installation of a 2100 hp Fairbanks-Morse dual-fuel engine in January, 1957, the operating picture has been further improved. Fuel costs per kwh have been cut by 11½ percent; total production costs by just over seven percent. During its first two years, 1957 and 1958, the new engine accounted for 72.4 per cent of the power generated, or 13,121,000 kwh of the total 18,116,900 kwh.

Exterior of the Sabetha power plant. Tank car delivers diesel fuel to a 10,000 gal. above ground tank, 15,000 gal. underground tank.

To June 1, 1959, this engine had run 18,595 of possible 20,976 hrs. or 90 per cent of the time. In 1958 and for the first five months of 1959 the time percentage was even higher—92 percent for the 12 months of 1958, 94½ percent from January to June, 1959. Except for a routine shutdown every 600-700 hrs. for preventive maintenance, the engine has run day and night since it went on the line on January 8, 1957.

The new engine is a 6 cylinder, 2100 hp, 31AD18 Fairbanks-Morse dual-fuel unit with bore and stroke of 18 in. x 27 in. It is direct-connected to a 1500 kw, 2076 kva, 277 rpm, 3 phase, 60 cycle, 2400/4160 volt F-M alternator with chain-driven



Municipal power dates back to the turn of the century at Sabetha. Today this plant houses three F-M dual-fuel engines, one F-M straight diesel.



exciter. Its addition brings plant capacity to 3906 kw, ample to handle the peak load, which reached 2440 kw in 1959, even if one of the big engines should be out of service. This firm capacity is vital to Sabetha for its major industries depend on unfailing power, with peak demand in July and August when air conditioning and farm use are also heavy. Peaks are reached again in January and February. One of the largest farm owned cream-

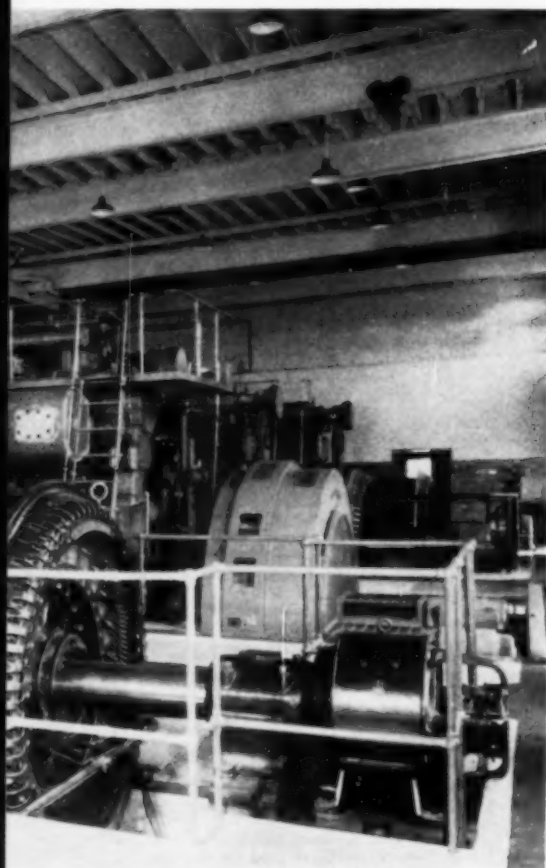


Since installation at the Sabetha municipal power plant in January, 1957, of this 2100 hp, 31AD18 Fairbanks-Morse dual-fuel engine, total plant fuel costs per kwh have been cut by 11½ percent; total plant production costs by just over seven percent.

eries in the world, the Nemaha Cooperative Creamery, is located at Sabetha. Other industries include a factory and demonstration plant for pellet and feed machinery and a feed mill.

Sabetha is in the heart of one of the richest agricultural areas in Kansas. For the past 30 years surrounding rural areas have been electrified, getting their power from the Sabetha plant, accounting for just over 27 percent of power sales in 1958.

The town started up its first plant around 1900 with Corliss 200 and 300 hp steam engines. In 1922 the city commissioners bought the first diesel engine. This was actually a 300 hp semi-diesel. The next year a similar engine was purchased. A 360 hp engine was added in 1925 and a 600 hp in 1930. All have since been replaced to make room for the present plant's four Fairbanks-Morse engines.



The No. 1 engine in the present plant is an 875 hp 606 kw diesel installed in 1937. Between 1937 and 1947 power demand increased by 105 percent and in 1947 a 1200 hp, 840 kw unit was installed. Three years later, with kwh production up another 25 percent, to 4,900,000, a 1400 hp, 960 kw diesel was added. In 1954 peak load reached 1560 kw; kilowatt production 6,800,000. Only in 1957, when the latest 2100 hp, 1500 kw F-M unit went into operation, did the plant again have a firm capacity.

Today all but the 875 hp engine operate as dual-fuel units. Natural gas rated at 975 to 1000 Btu

reaches the plant at about 35 psi and is reduced by pressure regulators to reach the big engine at 31 psi. All four Fairbanks-Morse engines use special diesel fuel which has a 28-30 grav. API. Delivered by tank car, it is stored in one 15,000 gal. underground tank and one 10,000 gal. above ground tank before delivery by a motor driven transfer pump to individual 600 gal. day tanks.

Since the new engine went into operation in January, 1957, total plant fuel costs dropped first to 3.74 mills for 1957, then to 3.52 mills per kwh for 1958. This compares with a kwh fuel cost of 3.98 mills in 1956, a reduction of 11½ percent.

Air is drawn through an oil-bath filter on the roof to a 10,800 cfm blower, which has a discharge pressure of 3.25 psig, then through an intercooler to the big engine. A 200 hp, 3550 rpm F-M motor drives the blower. Exhaust vents through a vertical silencer. The heavy duty lube oil used for this 2100 hp engine passes through both a by-pass filter and a full-flow lube filter. The entire plant employs the same closed cooling water system with atmospheric cooling tower for the raw water circuit. Shell and tube heat exchangers and oil coolers are used for all but the oldest diesel. Two centrifugal pumps handle the water between exchangers and tower and one pumps raw water to the oil coolers. There is a separate pump for the jacket water circuit of each engine.

The control panel on the 2100 hp F-M engine includes an exhaust pyrometer, pressure and temperature gauges; alarms and controls on lube pressure; jacket water pressure and temperature, blower bearing oil pressure and temperature; controls for the intercooler pump, crankcase vacuum pump, before and after pump; and the air control valve. The plant is served by a 14 panel switchboard.

During 1958, (1959 records were not complete at this writing) Sabetha's power plant generated 9,415,700 kwh, a record high, and had gross revenues of \$165,407.95. Yet citizens acquired the plant for just \$10,000, the total of the bond issue voted in 1901 to start the municipal electric system. All subsequent purchases were paid for out of profits based on economical power production.

Prominent among those who have built the Sabetha plant to its present level of efficiency and



This Ross jacket water heat exchanger and Ross oil cooler serve the 1200-hp dual-fuel F-M engine. Ross heat exchangers and oil coolers also serve the 1200 and 1400 hp F-M engines.

profit is former City Engineer C. A. Darby. The Sabetha municipal electric system is currently directed by Mayor Donald R. Jones; Arlie Gilbert, commissioner of finance; Harvey E. Lukert, commissioner of streets and utilities; Alma Aberle, city clerk; and department executives David E. Vancil, city engineer and manager of utilities; Homer Bechtelheimer, plant superintendent; and Arthur Gates, distribution foreman.

#### Principal Equipment for 2100-Hp F-M Dual-Fuel Engine

Generator	Fairbanks-Morse
Fuel oil filter	Nugent
Lube oil filter	Air-Maze
Thermostatic valves	Amot
Heat Exchangers	Ross
Oil coolers	Ross
Air filter	Air-Maze
Blower	Roots-Connerville
Pyrometer	Alnor
Switchboard	General Electric Co.
Fuel Oil	Standard

#### Sabetha 1958 Operating Data

	Kilowatt-Hours Generated		Gallons Fuel Oil		MCF Gas	Fuel Cost	Engine Hrs.
	No. 2	Total Plant	Number 2	Plant	Plant	Per Kwh (Mills)	Number 2
1958	(2100 Hp.)						
Jan.	500,000	831,200	4,125	17,392	8,156	3.6413	577
Feb.	486,800	741,400	7,640	20,843	7,349	4.2159	556
Mar.	623,300	785,600	4,267	6,139	9,266	3.0244	738
Apr.	558,700	728,500	4,059	6,001	9,816	3.3947	687
May	601,500	774,700	4,114	6,008	9,785	3.1851	731
June	577,000	759,000	3,994	6,106	10,514	3.4488	696
July	611,100	826,600	4,144	6,476	10,583	3.2173	722
Aug.	603,900	867,300	4,051	7,502	11,670	3.4021	707
Sep.	563,300	748,300	3,968	5,809	10,651	3.5036	707
Oct.	551,200	742,900	4,220	7,326	9,542	3.3694	716
Nov.	529,600	743,400	3,990	6,049	10,395	3.5115	687
Dec.	504,800	866,800	6,993	24,815	8,234	4.2995	609
TOTALS	6,711,200	9,415,700	55,565	120,466	115,961	3.5176	8,133

# DIESEL SETS RESPOND TO MICROWAVE SIGNALS

By DOUGLAS SHEARING

**T**HEY did it with mirrors! Result of the mirror trick, performed to help locate sites for communications stations: a man in the Los Angeles refinery area can start, route, measure, and stop the flow of up to 80,000 bbls. of crude oil a day through a 16 in. pipe line that originates 650 mi. away in Southeastern Utah. In five remote microwave stations, five pairs of two cylinder diesel engine generating sets supply the power that makes this control possible and are themselves, started and stopped or otherwise operated by remote control. Model 4FS2 Nordberg Power Chiefs were used. They are 2 cylinder, 4 cycle units, rated 20 hp at 1200 rpm with bore of 4 1/2 in. and stroke of 5 1/4 in. Each is direct connected to a Kato 10

kw 115/230 volt, 60 cycle ac generator, with 500 watt, 75 volt dc exciter.

Crude oil for this line is gathered in Navajo Indian country where the corners of Utah, Colorado, New Mexico and Arizona meet. Drastic elevation changes along the route of the pipe line introduce factors not normally encountered. The 16 in. line starts at Red Mesa, Utah, at an elevation of 5,270 ft. It rises to 6,690 ft. at its highest point and ends at an altitude of only 15 ft. in Compton, Calif. To boost the oil over the mountains, pressure is added to the flow. On downhill slopes, the cumulative weight of the crude in the line increases this pressure until, at low elevations, it could rupture the line. Therefore, the line has two pressure reduction stations in addition to three pumping stations—all remotely controlled.

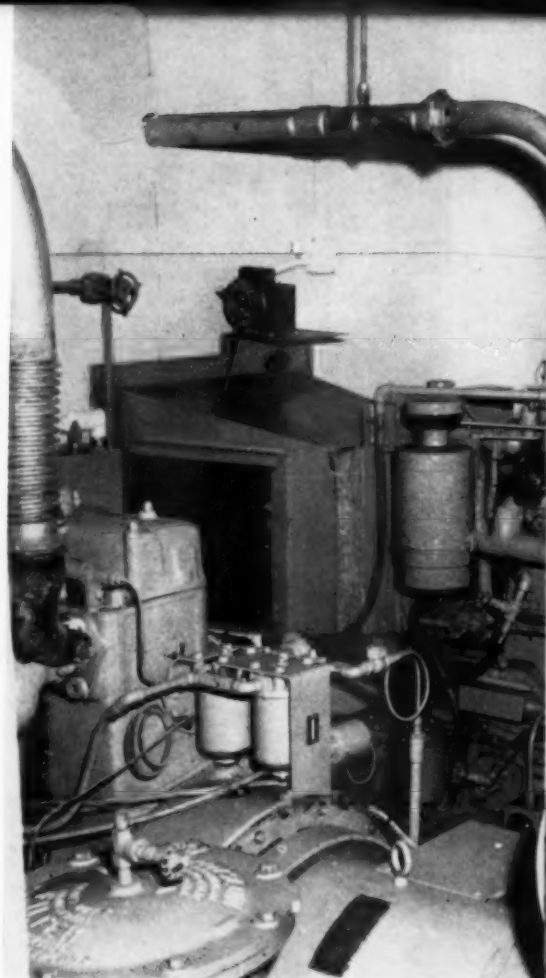
By pressing buttons, a dispatcher in Compton can initiate action all along the line by microwave radio. By microwave, the dispatcher opens certain valves and closes others as the routing demands. He can dial a 2 digit number to learn the depth of oil in a tank in Kingman, Ariz. Gauges show critical pressures and flow rates at various points. If pressure increases beyond a pre-set safe limit, the dispatcher is warned by visual and audible alarms, and he takes corrective steps—by microwave. Or, for example, it may be desirable to exercise the standby diesel engine on Butler Peak, 76 mi. away. A technician dials 29, code for Butler, followed by 47, code for an automatic switch to start the standby engine. Or, by dialing 29 in combination with a long checkoff list of other two digit code numbers, other vital functions can be tested at the Butler Peak station.

The "wireless" system by which all this remote control is possible consists of seven communications terminals and eight repeater stations. The signal paths do not parallel the course of the pipe line which follows the contour of the earth over or around hills. Microwave radio beams travel in a straight line and need a clear "line of sight."

Shell Pipe Line Corp., agent and operator for Four Corners Pipe Line Co., designed the system. Two communications engineers were assigned to locate sites for the microwave transmitting-receiving towers and adjacent equipment buildings. They quickly found that existing maps and topographical charts of the desolate country between Red Mesa and the Los Angeles basin were not accurate enough for their purposes.

How do two electrical engineers go about establishing the exact location of antenna towers on

◆ The Four Corners Pipe Line microwave station at Butler Peak (el. 8,352 ft.) overlooks California's popular Big Bear lake recreation area.



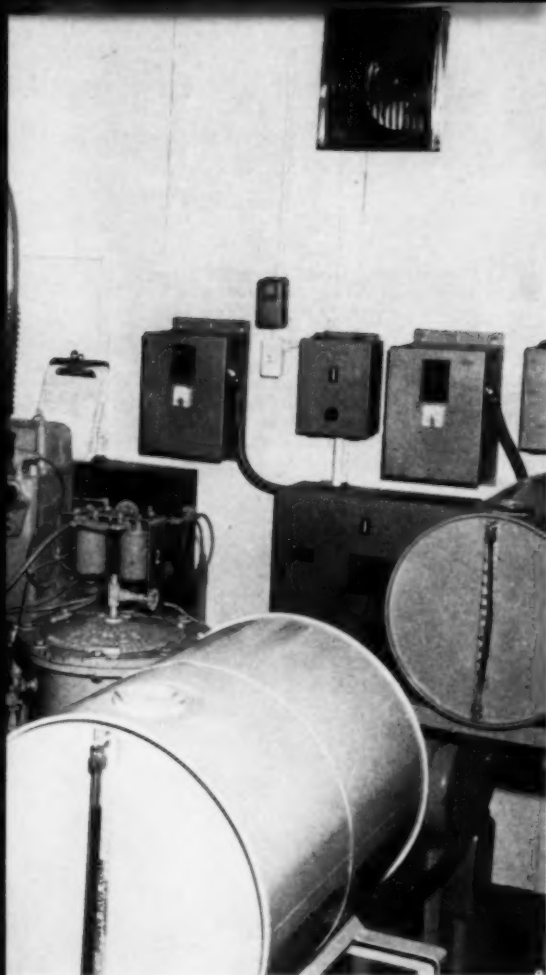
Each of the five remote repeater stations is equipped with two 20 hp Nordberg Power Chief diesel engines direct-connected to 10 kw Kato generators. Lube oil is supplied from tanks mounted above the generators for long, unattended service. Note Vortex air cleaner, Winslow and Fram lube oil filters.

peaks as much as 100 mi. apart, making certain the line of sight between them is clear? To complicate the problem, each site, excepting the two at the ends of the line, also must have an unobstructed line of sight with a tower in the opposite direction. Here's where mirrors entered the picture. The men found they could spot each other's positions through binoculars when they reflected the sun's rays with 20-in. dia. mirrors. They needed sunny, hazeless days, so weather often tied them down for three or four days. And many a tentative spot proved to be lower than an intervening peak, or to be behind a rocky ledge.

Strip heaters secured to repeater station induce artificial load to the engines. Each fuel storage tank holds 2,500 gals. of No. 1 diesel oil.







Five tower sites are in such isolated areas that tapping public power lines was out of the question. Power is provided for at these five stations by Nordberg diesel-electric generator sets,—two at each site. In addition to their contribution to the unique supervisory system, these diesel installations are interesting for several other reasons. For one thing, they operate at altitudes where the loss of power is considerable—Roof Butte 9,790 ft.; Marsh Pass 7,327 ft.; Granite Mountain 3,987 ft.; Tip Top Mountain 7,519 ft.; and Butler Peak 8,352 ft. These locations experience rapid temperature changes from day to night with widely separated extremes from summer highs to winter lows.

The engine room and the microwave equipment room occupy opposite ends of an insulated sheet metal building with a small entry room between. Air for the engine room is drawn into the entry room through a cupola in the roof and thence through a 4,850 cfm oil-bath air filter, built into the engine room wall, to eliminate all chance that automatic switches and engine alarms could become fouled by dust. The engine fan blows outward through the radiator into a duct which vents

through the back wall of the building. An automatic device opens the shutters in the sides of the duct and closes the louvers in the vent so warm air will stay in the room to maintain an 80 degree temperature. There are two diesel fuel storage tanks behind the building, each with a capacity of 2,500 gal. Although No. 2 diesel fuel is recommended in Nordberg Power Chief engines, the mechanic in charge of the pipe line's six Nordbergs located in California is using No. 1 diesel fuel as he feels this contributes to quick, easy starting in case an engine casualty requires automatic starting of the standby unit.

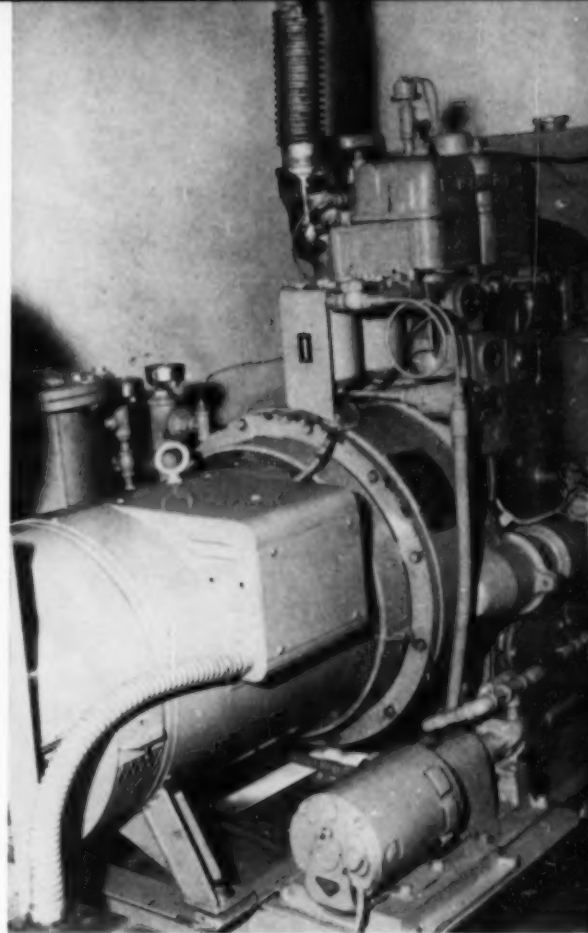
Even though the engines operate under adverse conditions; high altitude, using only 12 of the rated 20 hp (a portion of the load is created by strip heaters secured to the outside of the building) and burning No. 1 fuel oil, fuel consumption averages only five pints per hour. Because of the infrequency of service for the filter elements, a 10-gal. capacity industrial-type oil filter has been connected to each engine. This is in addition to the filter supplied with the engine. A small heat exchanger is installed between the two engines to keep jacket water in the standby engine warm at all times for better operation.

The Nordbergs are equipped with electric starters and with 12-volt storage batteries. There is an extra battery and charger at each diesel repeater station. Automatic switching gear provides for stopping one engine and starting the other in case the operating engine registers high temperature, low oil pressure, or malfunctioning. The start and stop switches also can be manually operated over the microwave system. An antenna tower is included at each microwave station. The tower at Butler Peak is 140 ft. tall. The highest one, 350 ft. is at Marsh Pass.

#### List of Principal Equipment

Engines (2)	Nordberg
Generators	Kato
Exciters	Kato
Air intake filter, engines	Vortex
Lube oil filters	Fram & Winslow
Fuel transfer pump	Viking
Spark arrestor-muffler	Burgess-Manning
Starter	Auto-Lite
Engine room temp. controls	Honeywell
Microwave system	General Electric

One of two pressure reduction stations on the Four Corners line. Pressure is reduced by friction through the 65 ft. tubes called "bundles". Incoming pressure here is normally 600 psi—outgoing is between 200 and 300 psi.



One of the Power Chief diesel-electric sets showing engine-mounted control switches, gauges. Sets provide current to relay supervisory data to equipment along 650 mi. pipeline.

Microwave instrument room shares the insulated mountaintop building with engine room. Communications engineer is shown checking a circuit.







One of three Deutz air-cooled diesel driven Scoot-Crete ore carriers used by Armco Drainage Co. in digging three tunnels of from 2,000 to 3,000 ft. each. Carriers worked on a three shift, 'round the clock basis logging 4,000 hrs. in completing total job. The one-cylinder FIL 712 Deutz engines, rated inter. 10 hp, 1800 rpm, averaged 3 gal./8 hr. shift.

## THE "MIDGETS" BID FOR MAN-SIZED JOBS

**Small Diesels Moving In Rapidly In Major Application Areas; This Article Highlights This Trend and Then Focuses on Impact in Construction Industry**

**I**N a midwest orchard, a farmer directs insecticide at his fruit trees . . . his spray pump powered by a husky, pint-sized single cylinder diesel developing some 3.5 hp. "Until a couple of years ago," concedes the farmer, "I'd have nothing but gasoline power on this job . . . now, tho, I'm sold on these small diesels."

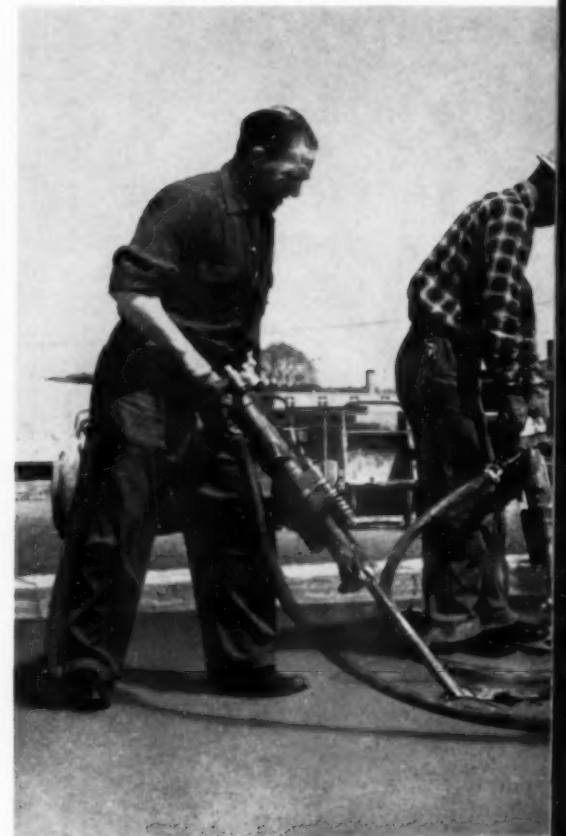
In a southern warehouse, a forklift hefts its load to a waiting rail car. "Sure the engine's a diesel," gestures the driver, "it's small but it's got lots of power despite its size."

A big rig, eastbound from Los Angeles, pulls into a truck stop. "Service my little diesel", the driver tells the station man, "I've got a cold cargo and this 30 hp engine is powering the reefer system."

Small diesels? They're forging into a spanking new market—and elbowing into a domain once domi-

nated by gasoline and butane. They're invading construction sites, agriculture, transportation, the oilfields and industry generally. And just as many are being initiated into marine service—to power winches, furnish auxiliary power and man pumps.

What's the explanation for the rise—a sudden one—of the small diesel? Simplest and most pertinent answer comes from a small-engine company official: "Generally, I'd say several factors have quickened the sales pace. Engine builders have developed broader engine lines for far better adaptability, have made important design changes, and have scaled down production costs . . . not as low as for comparable gasoline horsepower, but close enough to more than justify the dollar and cents savings. By the same token, larger diesels are now part of the operator's everyday life and good experience here makes it easy to step in the small diesel direction.



"You have to fit these little engines into their proper economic niche, recommend them where they fit snugly—and sensibly," he says. "In the marine and petroleum field, you've got to demonstrate long-life, low cost maintenance . . . and safety, the fact that in these areas, where gasoline is a real danger, diesel fuel is non-volatile.

"Where diesel dependability is the need . . . as in oil field pumping, plant air systems, pit lighting, and agricultural irrigation . . . you hit that point hard. Where continuous service around the clock, 24-hours a day, is essential . . . that's the small diesel's logical niche, too. And your strong point."

But stark economic factors are helping, too. In recent issues of DIESEL AND GAS ENGINE PROGRESS the editors have brought you timely articles on the economics of small diesels in on-highway and railroad reefer service, taxi-cabs, ag-

Jaeger 125 cfm. air compressor is powered by a Perkins four-cylinder L4 diesel engine. Working on a road construction project in Toronto, this diesel, in an average 8 hr. day, consumes 5 gals. of fuel compared to 12 gals. of gasoline consumed on similar projects by gasoline engine driven Jaeger 125 cfm. compressors.



riculture, etc. Let's take a close look now at the construction industry and the reasons why these small diesels are moving in quickly and economically. Aside from the fact that all diesels are designed for low-cost, continuous, heavy-duty application, there are a number of reasons for this swing to small diesels as opposed to gasoline driven units of similar sizes. Chief among these are:

1. Heavy construction people are diesel minded. Most of the equipment they work with every day is diesel engine equipped. Diesel fuel is always stored at the construction project and most of their mechanics are trained diesel men.
2. Diesel engines used in any phase of the heavy construction industry must, because of the nature of the operations, give good service with a minimum of trouble. With long hours of running time demanded on almost every job, trouble can be expected . . . but maintenance is seldom a problem when adequate parts and service facilities are quickly available.
3. Heavy construction jobs are figured on the basis of each piece of equipment carrying its share of the construction job. Failure of one unit can, and does quite often, shut down production. A light plant on a night lighting job, if down, stops that part of the job. Likewise, an air compressor, a shovel, or any other of the thousand and one items used has the same responsibility to the overall-production. Increased use of heavy-duty diesels for these applications by the heavy construction industry testifies to their efficiency . . . and reliability.
4. Competition is very keen on all construction bidding. Contractors cannot include costs of spare equipment as this would run up the total bid on the job. They can only figure on a breakdown maintenance basis to be the success-



Four-poster floodlighter rigs like this are popular with Canadian contractors. This unit is powered by an Onan 5 kw air-cooled diesel electric generating set.

ful bidder. A diesel figures to provide more operating hours at less overall cost than a gasoline unit.

The small diesel is a versatile tool at any construction site. It is used extensively as a portable or mobile source of electric power to operate floodlights for night work, but from this basic use enterprising contractors are finding more and more jobs for this little powerhouse.

Here's how one large construction company is utilizing diesels. It has six air-cooled, 3 kw diesel plants installed on mountain tops to power radio communications systems between job foremen and base camps. The units are set up in groups of two, with one generator acting as standby for the other. An automatic line transfer switch cuts the standby plant in whenever the primary power unit fails to function normally. These diesel plants are unattended . . . running continuously for more than two months in the winter. Large tanks of diesel fuel and oil, with automatic oil level maintainers, assure constant operation. In addition to the six the company is using other 3 kw diesels on their shovels, for lighting night projects, and have over forty 5 kw air-cooled diesel generating sets installed on 4-poster trailers as mobile floodlighters.

The further you look, the more applications you find—small air compressors, concrete-aggregate haulers, pumps, loaders, tampers, flood-lights and the list goes on. And as you scan this list, you see the names of prominent contractors like Morrison-Knudsen, Guy F. Atkinson, Peter Kiewit, Pitts Foley and others who have put these midgets to work. The future for the little diesel? It's bright . . . and sales make it look even brighter as the "midgets" bid for—and get—man-sized jobs.



Two cylinder American Marc AC-2 diesel drives a Berkeley irrigation pump on Arvida Farms near Miami, Fla.





# DIESELS ADD ECONOMY TO THREE FLORIDA BOATS

**Fishing Vessels and Pleasure Craft Repowered from Gasoline to Volvo-Penta Marine Diesels Show Good Reduction in Operating Costs**

By ED DENNIS

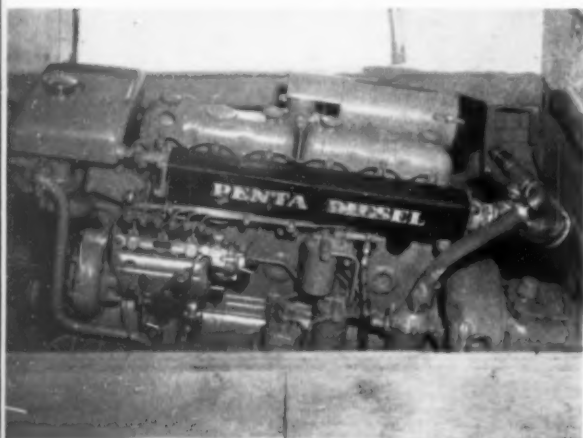
**S**AFETY at sea plus fuel economy were the aims three boat owners had in common when they repowered from gasoline to model MD47 Volvo marine diesel engines, yet all three vessels are used in different phases of the marine field. The first conversion was in a crayfish trap tender, the *Dragnet*. Next was the charter boat, *Rut-Cry II* and third was the pleasure craft, *Red Fox*.

The experiences of smooth running and fuel economy of the charter boat *Helen S.* (see Diesel and Gas Engine Progress, April '59) prompted the owners of these three boats to repower their vessels to marine diesel engines. All three Volvo installations were engineered by J. Keith Kelly of the J. Frank Knorr Co. in Miami, Fla. Now, several months later all three owners report they have ob-

tained their objective, namely improved engine performance and increased safety and have cut operating costs considerably. The versatile marine diesel thus scores three more hits with the Florida marine industry as both a workhorse in commercial fishing vessels and as a nearly silent propulsion unit in pleasure craft.

## Dragnet Repowered

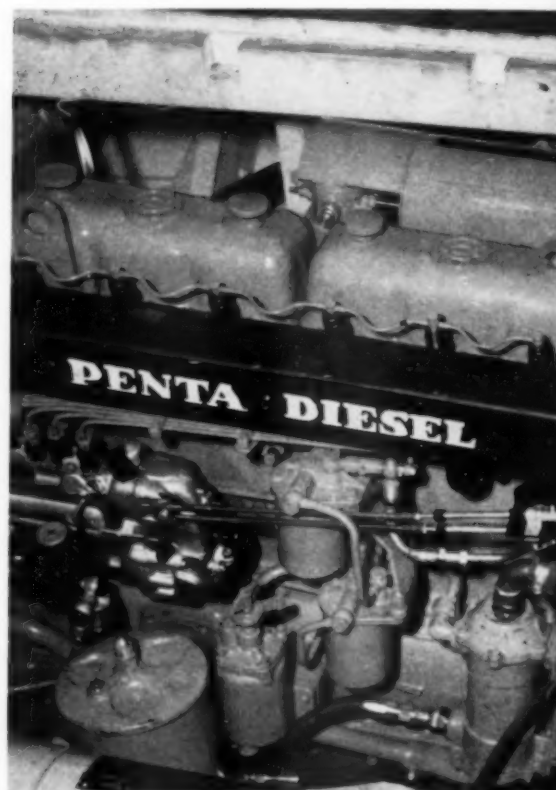
The first of the Volvo installations was in the *Dragnet*, a 33 ft. crayfish fishing tender operated



◀ New starboard 82 hp Volvo Penta diesel with Snow-Nabstedt 2:1 manual operated reverse-reduction gear on the *Rut-Cry II*. Also shown is the Robert Bosch fuel injection pump and governor.

One of two model MD47 Volvo Penta diesels that power John A. Belcher's 46 ft. pleasure craft *Red Fox*. Each engine is rated 82 hp at 2500 rpm. Equipment includes 2:1 Borg-Warner hydraulic gears. ▶

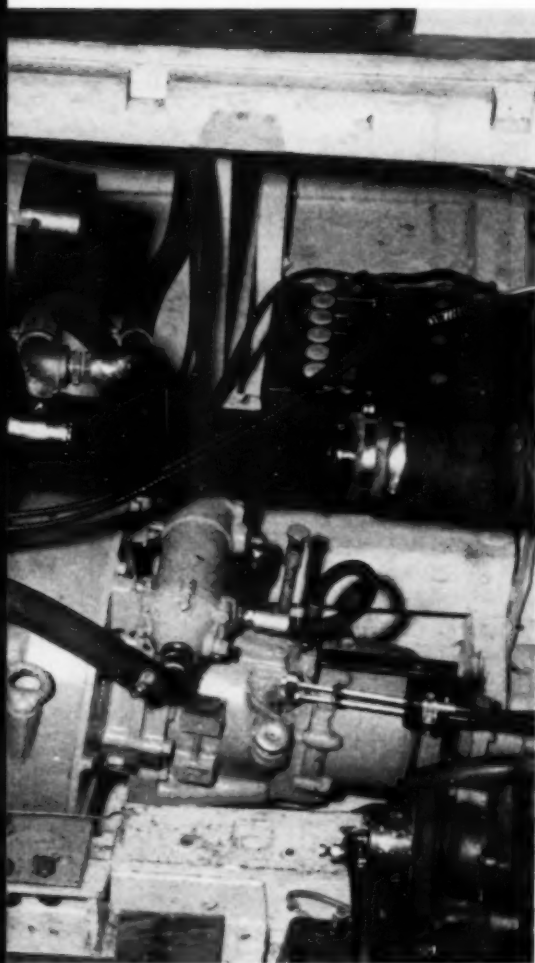
◀ *Rut-Cry II*, 34 ft. charter fishing boat built by Chris Shipyard and skippered by Captain Van Fleet of Pompano Beach on its trial runs after being repowered with a pair of Volvo Penta diesels.





by an ex-navy man who saw service in the South Pacific, Capt. James H. Lee of Miami. Originally powered by a 165 hp gasoline engine, the craft was repowered with a MD47 Volvo Penta diesel engine rated 82 bhp at 2500 rpm. The engine works through a Capitol 2.5:1 model 2HE 10,200 hydraulic marine reverse and reduction gear combination and not only drives the 22x21 in. propeller, but also provides power through a front end power take-off for the crayfish traps winch.

Crayfish fishing in Florida and its adjacent waters is interesting but hard work: hard on both the



fuel tanks give the craft a new working time of about 40-45 hrs. without refueling if necessary. A breakdown of the old and new operating costs, reads as follows: old gasoline engine 165 hp with 2.5:1 r&r gears fuel consumption 5.3 gals. of gasoline/hr. at 26 cents a gal. for a 16 hr. day against the new model MD47 Volvo 82 hp diesel with same gear ratio and a fuel oil consumption of two gals./hr. at 17 cents per gallon.

During the winter season, Capt. John Van Fleet, docks his 34 ft. charter boat the *Rut-Cry II* at Pompano Beach. Originally powered with a pair of 125 hp gasoline engines the craft was repowered in the spring of 1959 with a pair of MD47 Volvo Penta diesel engines. The new diesel engines with a bore and stroke of 3.75x4.33 in. develop 82 bhp at 2400 rpm and transmit their power through model 3734 Snow Nabstedt 2:1 reverse and reduction manually operated gears and 20x20 in. Federal Equipoise propellers to give the craft a speed of 11 mph at 2300 rpm.

### Increases Range

The *Rut-Cry II* is a Chris built charter vessel measuring 34 ft.x11½ ft.x36 in. She operates in Maryland waters during the summer months and on the Florida Gold Coast during the winter season with special charter trips to the Bahama Islands. Now, according to Capt. Van Fleet, the *Rut-Cry II* will have a greater cruising and fishing range to the adjacent islands where refueling facilities are scarce. A quick look at the vessel's log tells the following story, new fuel oil consumption four gph at 22 cents per gallon against the old gasoline consumption of 15 gph at 38½ cents per gal. Lube oil consumption averages about 1 qt. per 100 hrs. and he uses Gulf HD Select. While the ship's speed has been decreased its cruising range has increased several times over so that the *Rut-Cry II* can fish a greater area for the big tuna

Stern end of the *Dragnet*. The new 82 hp Volvo marine diesel engine installation is being checked over by Captain James Lee, Keith Kelly who engineered the application and two marine mechanics from the J. Frank Knorr Co.



and marlin. The smooth running is attributed to the engine's precisely dimensioned and balanced parts which combined with the crankshaft's vibration dampener reduces both noise and vibration.

### Fuel Costs Down

The third installation was in the 46 ft. *Red Fox* owned by John A. Belcher of the Belcher Oil Co. and skippered by Capt. Steve Barrett. This twin screw vessel was formerly powered by a pair of 135 hp gasoline engines and at 2200 rph it consumed 7 gph of gasoline per engine. With the two new 82 hp Volvo Penta marine diesels its fuel consumption has dropped to less than half that figure. The new diesels on the *Red Fox* are directly coupled thru Borg-Warner hydraulic marine transmission and reduction gears to 1½ in. monel drive shafts and 20x19 in. bronze propellers. The port engine has a gear ratio of 2:1 and the starboard engine has a 1.9:1 ratio.

The *Red Fox* was built at Harkers Island, N.C., and measures 46 ft. by 15 ft. and draws 3½ ft. of water. Built in 1957 with a hull planking of 1¼ in. white cedar, it is classed as a cabin cruiser and is used by Belcher for pleasure cruising and fishing. Diesel engines are not new to John Belcher as he is secretary-treasurer of the Belcher Oil Co. and an executive of the Belcher Towing Co. and Belcher Asphalt Co. both of which use numerous pieces of dieselized equipment in their operations.

I should also mention another recent Volvo marine installation in Florida. This one is on the *New Helen S* a 65 ft. party fishing boat. This installation included a Penta model MD67 which delivers 115 hp at 2400 rpm, a model 2HE-10-700 Capitol hydraulic clutch and reverse 2.5:1 gears. The engines were installed with an inboard lay of approximately 3.5 degrees and were also engineered by the J. Frank Knorr Co. in Miami.

The 33 x 10 ft. crayfish trap tender *Dragnet* just after finishing its run laying nets on the bottom of ocean near Miami.



crew and the engines, as the traps weigh as much as 80 lbs and are weighted with about 50 lbs. of concrete which enables them to maintain their position on the ocean's bottom. These traps are set in depths varying from 25 to 160 ft. and are strung out over a 70 mi. area along the Florida coastline.

At the beginning of the crayfish season, Capt. Lee tows a 30x60 ft. barge loaded with about 600 of the traps to the same number of anchorages. The trip takes about three days using the *Dragnet* as a tow boat. Competition is keen in this trade especially when Florida fishermen have to compete with the low waged fishermen from the nearby Bahama Islands who bring their crayfish into the Florida area duty free.

With this new Volvo Penta the flat bottom tender does 14 knots at 2450 rpm against an old speed of 15 knots at 3300 rpm. Two interconnected 50 gal.



## WHAT'S GOING ON IN ENGLAND

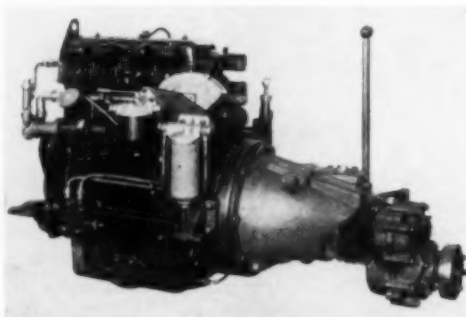
CONDUCTED BY BERNARD W. LANSDOWNE

Bernard W. Lansdowne is an associate member of the Institution of Mechanical Engineers and is widely known among British and European diesel manufacturers as a former editor of our English contemporary "Gas & Oil Power." His early workshop training was spread over seven years with A.E.C. Ltd., Southall, following which he served some five years with that company's sales engineering department. He is now manager-for-the-United Kingdom of a group of business and technical publications.

### New Petter Marine Units

**A**QUISITION of the Brush Group of companies including such famous diesel builders as Mirlees, National and Petters, by the larger Hawker-Siddeley group in the United Kingdom has led to some redistribution of production throughout the various companies in the group. One result is that all small air and water cooled engine production for the Hawker-Siddeley group formerly carried out for them by Armstrong Siddeley is now centered in Petters works at Staines, Middlesex. Petters have for many years offered a fairly comprehensive range of small marine diesels, but they took the opportunity at London's recent National Boat Show of extending this range by showing two new designs. In neither case is the basic prime mover of the new marine units a Petter design in that one is based on an existing Armstrong-Siddeley engine and the other is a marine version of the Standard-Triumph diesel already in widespread automotive use.

Petters are building the Armstrong-Siddeley marine units in one, two and three cylinder versions with ratings of 11, 22 and 33 bhp at 1,800 rpm respectively. A common bore and stroke of  $4\frac{1}{4}$  in. is employed. These engines are of aircooled design with cooling air supplied by a flywheel fan. The fuel injection system is of interest because it



Petters latest 45 bhp marine diesel engine with reverse-reduction gearbox. The basic engine is of Standard-Triumph design and has been used by Standard for automotive purposes.

incorporates individual fuel injection pumps for each cylinder mounted on the starboard side of the engine. The reverse gearbox can be supplied to provide either direct drive or a 2 to 1 reduction and engine starting is by hand through a dog-type starting handle operating on the half speed shaft at the forward end. A raised hand starting system operated from either the forward or aft positions is available as an optional extra. The engine dry weight ranges from 645 lb. for the single cylinder design to 1,177 lb. in the case of the 3 cylinder unit. Petters marine version of the Standard-Triumph diesel engine is based on the latter's 23CV-type engine and is available only as a four-cylinder water cooled design giving 45 bhp output. This engine has a bore of  $3\frac{5}{8}$  in. and a stroke of 4 in. giving it a capacity of  $2\frac{1}{4}$  litres. Ricardo

Comet MK V Swirl chambers form part of the cylinder head design and injection is from conventional C.A.V. injectors and distributor type fuel pump. In this case also the reverse gearbox can be either direct drive or with a 2 to 1 reduction gear. The dry weight of this unit complete with reverse-reduction gear is 830 lb.

### Kelvin Adds to T. Range

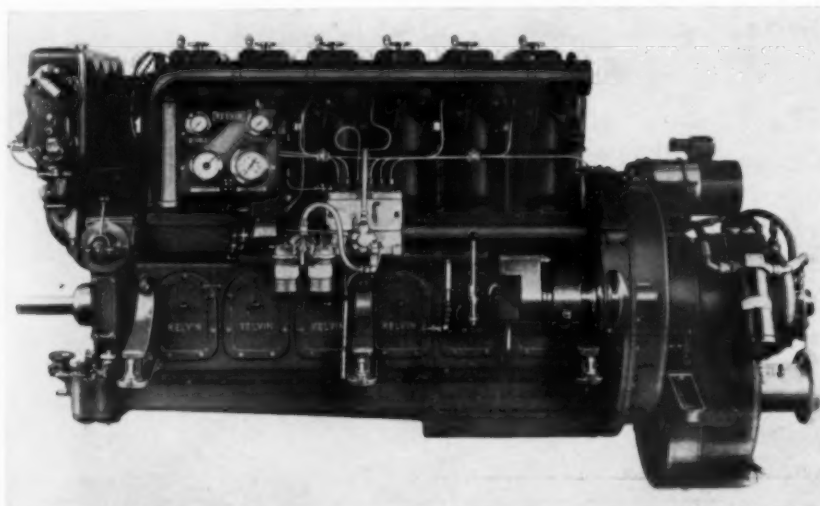
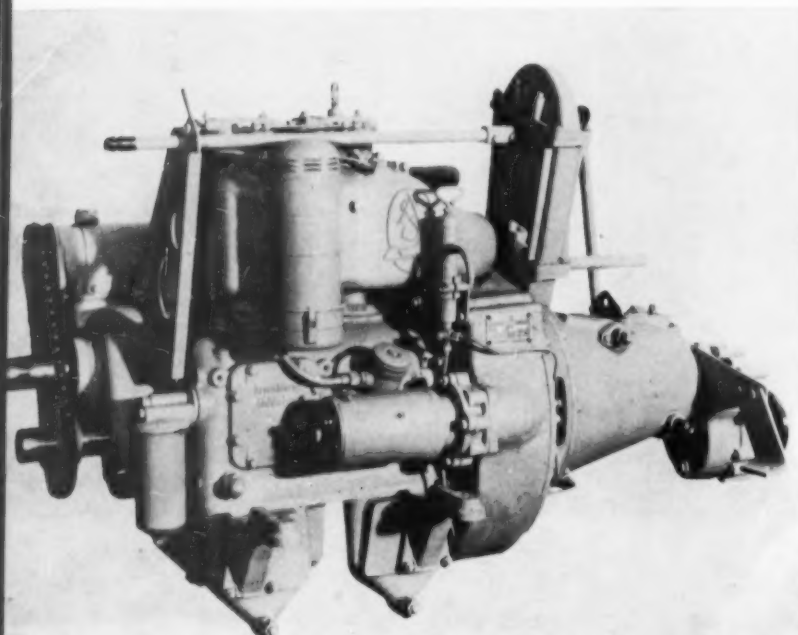
Two new Kelvin marine diesels produced in Scotland by the Bergius Co. were shown publicly for the first time at the 1960 National Boat Show in London. These are additions to the Kelvin T. series, the first of this line being an eight-cylinder design announced just over 12 months ago.

The four and six-cylinder units have basically similar design details to the original eight-cylinder model, which I described fairly fully in our issue of February 1959. The bore and stroke dimensions are  $6\frac{1}{2}$  in. and  $7\frac{1}{4}$  in. respectively, the output being 30 bhp per cylinder at 1,000 rpm. A closed circuit cooling system is employed and integral drives are arranged for the generator, bilge pumps, fresh water pumps, power take-off shaft or winch clutch. The engines can be fitted with hydraulic reverse reduction gears giving 2 to 1,  $2\frac{1}{2}$  to 1 or  $3\frac{1}{3}$  to 1 reductions, with propeller shaft speeds of 500, 400 and 300 rpm respectively.

Two cylinder Armstrong Siddeley air-cooled diesel now being built by Petters as a marine unit.



Latest in the Kelvin T series, this six-cylinder engine is rated 180 bhp at 1000 rpm.





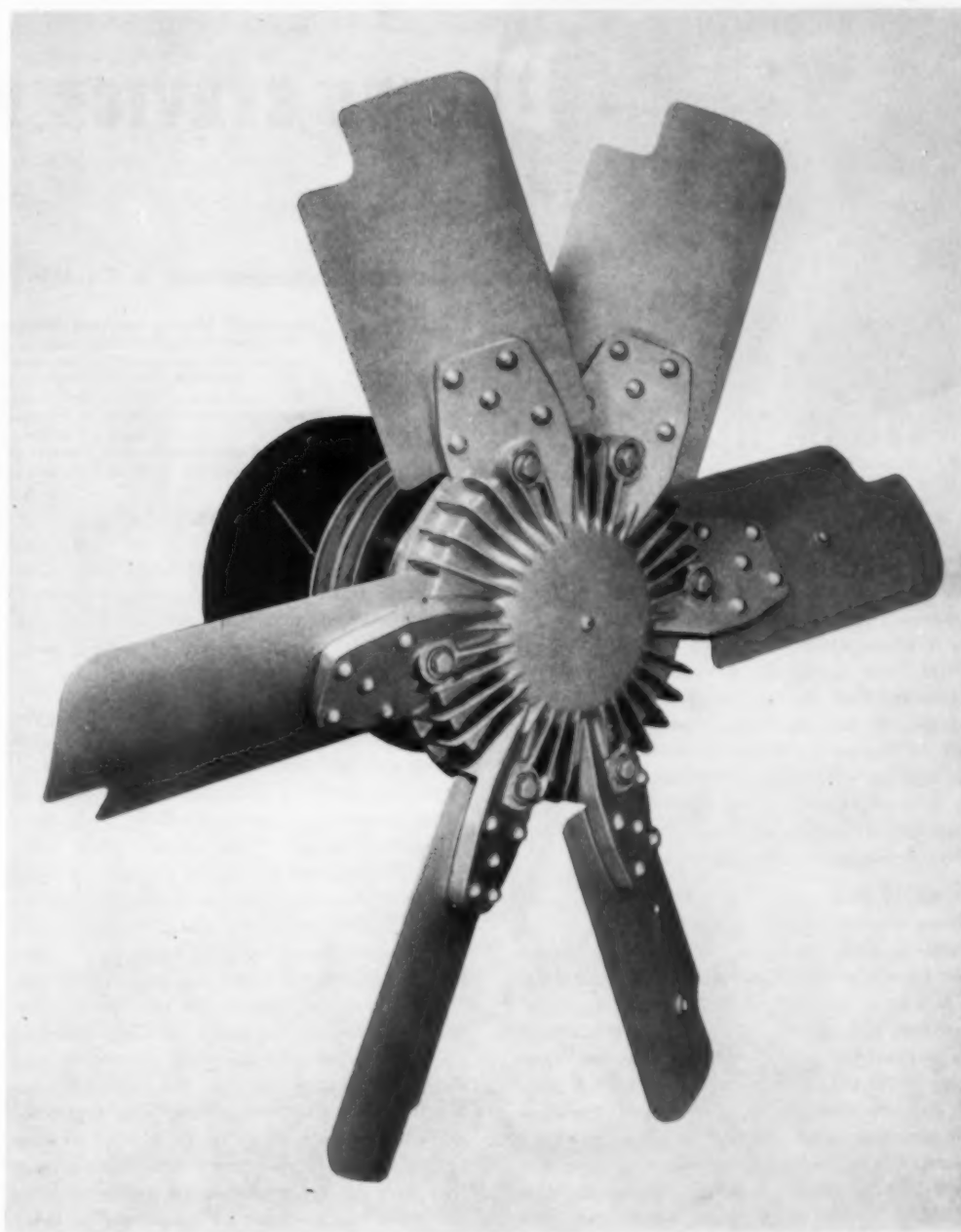
# NEW THERMO-MODULATED FAN DRIVES

A NEW series of "Thermo-Modulated" fan drives for trucks, buses and other heavy duty vehicles has been introduced by the Schwitzer Corp. These fan drives are designed to maintain constant engine temperature regardless of variations in engine load and outside temperature by modulating the fan speed.

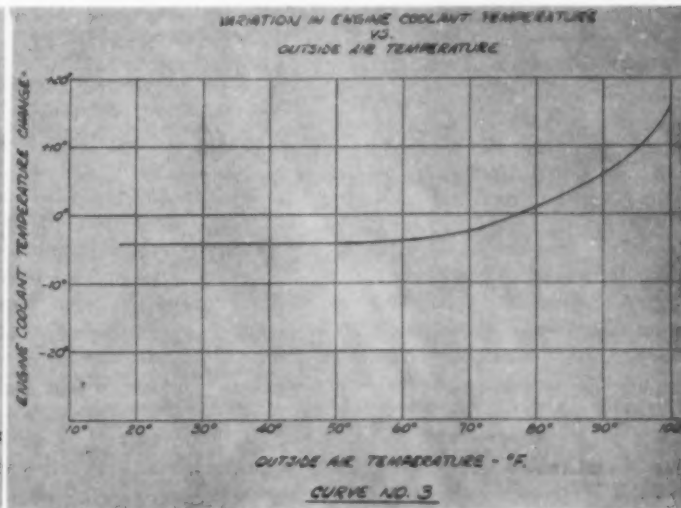
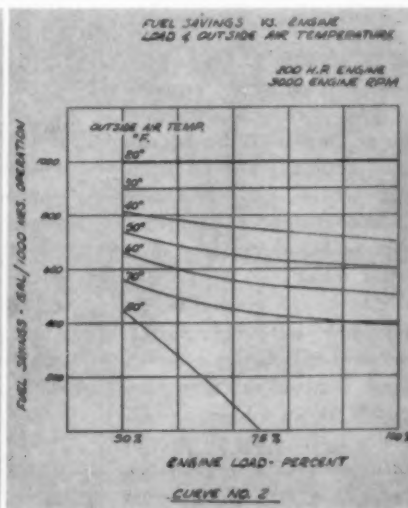
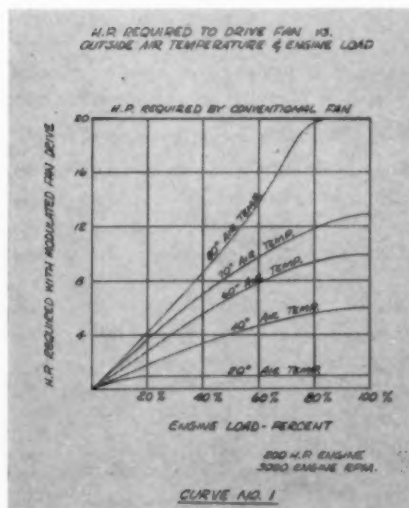
The drive operates on simple principles. The torque is transmitted from the input shaft to the fan by the shearing of a fluid film between input and output plates in a fluid filled housing. The control element, which is an integral part of the fan drive reacting to changes in engine temperature, varies the fluid film thickness between these plates to obtain changes in fan speed.

Since the power absorbed by the fan is a cubic function of the fan speed, even a slight reduction in fan rpm results in a marked decrease in the power required to drive the fan, and, in turn, a significant saving in fuel consumption. With a conventional fan system, for all conditions other than maximum temperature and maximum engine output, an over-cooling condition exists. To accomplish this, the power consumed by the fan ranges up to 10 per cent of the total engine power output. With modulated fan drive, however, in a typical example: If the outside temperature decreases from 100 degrees to 70 degrees F the fan hp required to maintain the desired cooling is reduced 30 per cent. If the power output is 80 per cent and temperature is 70 degrees F, 60 per cent of the fan power is saved. Curve number 1 illustrates the reduction in fan power for other operating conditions. This data has been taken from actual truck operation.

The application of the modulated fan drive has resulted in fuel savings of from five to ten per cent depending of operating conditions. Curve number 2 illustrates the gallons of fuel saved per 1,000 hrs. operation with variations in temperature and load. Curve number 3 shows control of engine temperature which is obtained over a wide range of outside air temperatures.



New Schwitzer fan with Thermo-Modulated fan drive. Fluid filled housing, control element are integral part of fan drive.





# D DIESEL SERVICE PROGRESS

A COMMENTARY BY GEORGE R. MACKEY

George R. Mackey was long associated with Detroit Diesel Engine Division of General Motors Corp., and had prior experience as a mechanic in Europe and the U.S.A., which enabled him to become well acquainted in the diesel and service fields and to obtain a broad scope of the service industry from the customer's and management's viewpoint. Further training at Carnegie Tech and in the Army Ordnance during World War II provided the necessary requirements in planning service programs. Progressive advancement in diesel service areas in General Motors and with Detroit Diesel led to his position as Supervisor of Service Promotion. Upon termination of employment with General Motors in 1952, he joined Clayton Manufacturing Company, and his present position with this organization is Sales Manager of the Dynamometer Division.

## Engine Rebuilding

**S**INCE introduction of the diesel engine as an economical source of power to the marine, industrial, and transportation industries, the need for complete service was readily recognized. Those in the know during the introductory years soon recognized that the maximum benefits for long engine life and economical performance could only be realized if planned maintenance and service were included. This service was first provided by field engineers and trained technicians who lived with an engine application until they knew every requirement for successful operation.

As the benefits of diesels over other sources of power became evident and more engines were installed in more applications, the service knowledge and know-how of company field technicians was passed on to trained personnel of authorized distributors and dealers. These early local service outlets, carrying on the work of the factory representative in their own areas, contributed a great deal to the advancement of the diesel engine as the most economical source of power for practically every field. Without their desire to serve and gain the confidence of the engine owner, it is doubtful if such great strides could have been accomplished in such a short time. These pioneer diesel sales and service organizations sold engines, engineered installations, and set forth programs to service engines in the oil fields, marine, industrial and transportation industries. While performing these duties, they continued to promote the use of diesel engines to many new fields and gained customer confidence by handling all of the owners' service requirements and engine rebuilds. This well-founded business flourished and prospered for many years and was equally beneficial to both the supplier and the user.

After many years of building sound sales and service programs, and enjoying the prestige of their accomplishments, a large number of diesel engine outlets awoke to the fact that the engine rebuild business which had taken years of planning to build had suddenly fallen off to a fraction of what it was seven or eight years before. A number of organizations who had previously enjoyed a total volume of 150, 200, or more engine overhauls per year claimed to be doing less than

50% of this volume. Others have admitted an even greater decrease in their engine rebuild business. The thinking of many of those concerned with this diminishing service volume points to many possible causes for the change in the service.

Some blame the manufacturers' parts merchandising programs, created to increase parts sales. Along with this thought, some feel that the promotion of parts kits encouraged many owners to perform their own service. While this may have had some affect on the total service volume, many service departments are equally to blame by using parts kits themselves instead of selling complete service as they did in the past. One tractor and diesel engine distributor recently stated . . . "we hardly ever pull an engine out of a tractor anymore; we just drop in cylinder kits." It is understandable that such practices are often necessary . . . but many times they are applied because they are the easiest way out. The cut-throat practices of unethical competition, both franchised and independent operations, are blamed by some for the change in the market. Many acknowledge that current engine models are better designed and built with a greater performance expectancy, and accumulate many additional hours between overhauls. Very seldom will you find an outlet that will admit to its own complacency or lackadaisical attitude towards advancing or expanding its own service facilities, even though this may be obvious to outsiders.

While the majority of sales and service organizations still actively promote their service facilities and continually inform owners of the benefits they can expect when purchasing factory recommended methods and practices, the organization interested only in selling engines or equipment with no planned service program to back up these sales gives the industry a "black eye." These "sales only" outlets have contributed greatly to the change of customer attitude and service market conditions. Even the attitudes of some service managers have changed. One old timer, who for years enjoyed an enviable service volume, recently remarked, "Why should I continue to beat my brains out when no one else in the organization cares?" Another asked, "How can I increase my

service volume if management refuses to give me the necessary equipment to provide quality service?" A letter from one service manager asks, "How can I sell the principals of my company on the need for expanding the service activities beyond that required just to handle warranty matters?"

While such attitudes may seem preposterous to some, they are only a few experienced in the national industry. A case in point is a service department limited by management to the total dollar volume per year to retain a certain income bracket. With such attitudes as these, is it any wonder that the service market has undergone a change? What will prevent engine owners from comparing their suppliers with some of the "grab-a-buck" fast talking automotive sales outlets who are only interested in new unit sales and are found in almost every metropolitan area?

During the past several months, there has been a noticeable change in attitude by many groups responsible for the servicing of diesel engines. Many manufacturers are planning to introduce new engine rebuild and service programs to their distributor dealer organizations. Independent repair shops and engine rebuild groups are taking a keen interest and automotive supply houses are awaking to the service potential in the diesel engine industry. These groups have, in the past, only dealt in the rebuild of short block assemblies. Some have only been experienced in the repair and overhaul of automotive type gasoline engines. But they are all planning to participate in the diesel service market.

This change in attitude by so many could be detrimental instead of beneficial to the diesel engine owner, as many of these shops will attempt to get into the business without the proper facilities and know-how to perform quality service. Therefore, it becomes the duty of qualified service outlets equipped with all of the requirements to offer complete service to inform the engine owner of what can be expected. They must take the lead and promote their facilities and guarantee the results of their service rebuild programs. These steps must be taken for the protection of the customer and to safeguard the reputation of the



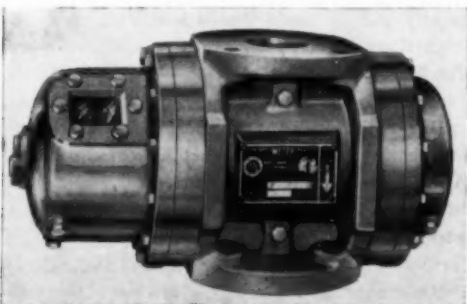
legitimate diesel service shop, as the "two-bit" shops, inadequately equipped to do the job properly, may use "gyp" or reconditioned parts to taunt the uninformed potential service customer with price instead of quality.

Manufacturers' programs, to aid their authorized distributor dealer organization, are naturally aimed at quality workmanship and guaranteed performance. This can only be accomplished by competent technicians working in properly equipped shops. These requirements, combined with an effective promotional program, will preserve the reputation of the manufacturer and the reputable service shop while building a greater service volume and customer confidence. Customer reaction to these complete quality service programs is encouraging as they are attracted to the shop which offers this type of service. Many owners, who in the past have attempted to perform their own repairs, have been attracted to these new engine rebuild programs and have found that the well-equipped shop can provide guaranteed service at a lower total cost than the do-it-yourself service, or that attempted by inexperienced and inadequately equipped shops.

Even though the diesel engine of today is better engineered and built for longer life, the larger engine population and the increasing application of the diesel engine to other fields presents a continuing expansion of the engine rebuild and service markets. Only through a continuation of quality service and guaranteed performance can the industry hope to maintain its past reputation and not be scorned because of customer dissatisfaction, a situation quite common in some other service industries.

#### Small Rotary Gas Meter

Employing a new concept in rotary-type positive displacement gas meter design, and aimed at providing accurate metering at lower cost, the 3M125 meter has been announced by Roots-Connorsville Blower Div. of Dresser Industries. This new unit can be flange mounted directly in either a horizontal or vertical gas line without need for additional support, and provides straight-through gas flow. A flow range to 3000 cfh, combined with a working pressure rating of 125 psig, is intended to adapt this meter to measurement of many industrial and commercial loads for which rotary-type meters have not previously been available. The permanent and non-adjustable accuracy feature claimed for the Roots rotary positive principle also is said to make it well adapted to service in remote or unattended locations. Constructed almost entirely of rigid, high strength cast iron, and sealed against gas leakage by an impregnation



process, meter weight is less than 55 lbs. The entire unit is made gas tight by heavy, domed end closures, which also carry the oil supply and are equipped with simple oil level sight glasses. Entrance of oil into the gas metering chamber at shaft openings is prevented by labyrinth seals. The standard production meter is equipped with a volume register, or counter, reading directly in cubic feet of displaced gas. By mounting this counter within one of the end covers, with read-

ings taken through a heavy glass window, drive problems inherent with externally mounted counters are considered to have been eliminated. For installations requiring more elaborate indicating or recording instrumentation, the volume counter is omitted and a special end cover is provided having means to support and drive the instrument. Additional details are contained in the manufacturer's specification sheet S-RMI-125LM

ITS NEW

## The World's Largest Manufacturers of FUEL INJECTION EQUIPMENT for Diesel Engines

Depots and Service Agents  
in over 100 Countries

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**FUEL INJECTION EQUIPMENT DIVISION  
of  
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Head Office: 501 West 42nd Street, New York 36  
Sales Office: 14820 Detroit Avenue, Cleveland 7, Ohio  
West Coast: 5025-29 W. Jefferson Blvd., Los Angeles 16, California

Branch Offices:

- 171 Beacon Street, South San Francisco, California
- 5001 West Belmont Avenue, Chicago 41, Illinois
- 400 South Edgewood Avenue, Jacksonville, Florida

Canadian Distributors: Joseph Lucas (Canada) Ltd.  
Head Office: 11 Davies Avenue, Toronto 8, Ontario  
Branch Office: 3401 St. Antoine Street, Montreal 30, Quebec

AP985

## Ad Manager Retires

Charles W. Kalbfus retired recently after 44 years with Elliott Co., Jeannette, Penn., and 39 years as advertising manager. After attending Wittenburg College, he went to work in 1915 for the Lagonda Manufacturing Co., Springfield, Ohio, and very shortly became advertising manager. Soon thereafter, this company was purchased by Elliott, and Kalbfus was transferred to Jeannette in 1920 as the first advertising manager of Elliott. Since 1923, Kalbfus has edited a well-known house magazine, *Powerfax*, which has a record of never missing a deadline of quarterly issues in 36 years. During the years 1931-1932 and 1935-1936, he was presi-



C. W. Kalbfus



O. F. Bricker

dent of the Pittsburgh Industrial Advertising Council. He is succeeded as advertising manager by Orville F. Bricker, who has been in advertising and sales with the Elliott Co. since 1943. Mr. Bricker has 35 years experience in industrial advertising, sales, and public relations work.

secretary-treasurer. D. B. Bogardus, assistant secretary and assistant treasurer, has been named secretary and assistant treasurer. The executives have been associated with Luber-finer, it is said, for periods ranging from five to 26 years.

## Diesel Applications Manager



W. G. Fortune

Walter G. Fortune, of Flat Rock, Mich., has been appointed manager, diesel applications, for Continental Coatings Corp., Cleveland, Ohio. Continental Coatings Corp. is the worldwide licensee for the flame ceramic process for the coating of piston-crowns, cylinder-heads and valves

of railway, truck, marine and off-the-highway diesel engines and other applications. Mr. Fortune for the past 15 years has been closely associated with diesel applications in manufacturing, field engineering, operating and instructing. His duties will include the developing flame ceramic applications more intensively in the truck, marine and off-the-highway diesel fields.

## Allis-Chalmers Will Build New Engine Plant at Harvey

Plans for a multi-million dollar engine manufacturing plant for the Harvey Works of the Allis-Chalmers Mfg. Co. have been announced by Owen J. Higgins, general manager of the works. Construction is to begin immediately on 35 acres the company acquired in 1957 and on which it has erected a modern engineering and development research laboratory in operation since 1958. The new facility will add 515,000 sq. ft. to the 654,000 sq. ft. of Plant No. 1 and Plant No. 2, which comprise the Harvey Works. It will be 1,100 ft. long and 440 ft. wide and of steel beam and cement construction. According to Higgins, the new plant will enable Allis-Chalmers to build a broad line of diesel, natural gas, butane and gasoline engines. These power many Allis-Chalmers products for the construction machinery, farm equipment and material handling fields. The engines are also sold to the construction and logging industries, to oil fields, for marine purposes, irrigation, and to those industries using the stationary and portable engine-driven generator sets produced by the Harvey Works. The many new machine tools to be purchased for the new facility, plus those to be relocated from Plant No. 1, will provide a modern high-production manufacturing operation employing a straight line production system in machining and assembling engines, according to Higgins. Floor area that will be vacated in existing buildings when engine production moves to its new facility will be made available for expansion of Allis-Chalmers material handling equipment production which is also carried on at the Harvey Works. According to Higgins, the new plant will enable the company to increase its employment at Harvey. The Harvey Works has been a part of Allis-Chalmers since the company acquired The Buda Co. in 1953. A story on the new engine plant and research facilities will be carried in a forthcoming issue of DIESEL AND GAS ENGINE PROGRESS.

**D.P.S. THERMOMETERS**

These instruments are a series of marine type thermometers designed for all diesels and all plant uses—water or oil.

**FEATURES** All brass construction, nickel finish, cork insulation.

(Repair service available)

No. 416H No. 426F

Price \$6.75 ea \$5.70 ea

40 years continuously in the diesel engine business.

Write for catalog.

**DIESEL PLANT SPECIALTIES CO.**

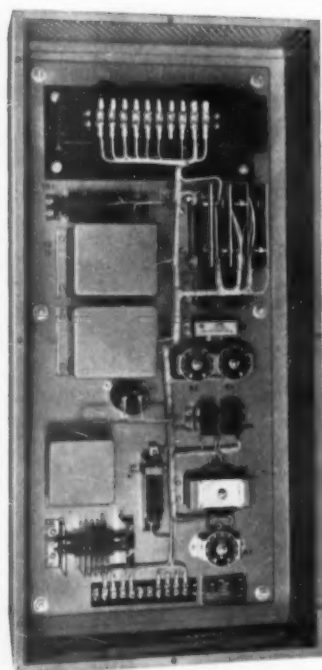
Box 316  
Stevens Point, Wisconsin

## New Executive Appointments



R. D. Buckles

Hugh W. Darling, president Luber-finer, Inc., Los Angeles, manufacturers of oil filters, announced this week the following promotions and appointments of key executives: Clarke Silcott, general manager, has been appointed executive vice-president and general manager. Robert D. Buckles, sales manager, is now vice-president and director of national and international sales. W. W. Boggs, secretary-treasurer, has been made vice-president in charge of production and remains



## F-33 Voltage Regulator provides $\pm 2\%$ regulation ... is completely static

The new Fincor F-33 Voltage Regulator is a completely static, magnetic amplifier controlled device which provides regulation of generator output to as low as  $\pm 1\%$ . It is compact, lightweight ... has no tubes to fail ... requires no warm-up time ... is ruggedly constructed for long, trouble-free service under conditions of high shock and vibration. Response time of the regulator alone can be as short as three cycles. The Fincor F-33 is designed for use on 60 cycle generators requiring a dc field supply up to 25 amps at 125 volts or less. If desired, field forcing can be provided with a current transformer. For complete information, write for Bulletin 3300.

**NET COST \$678.00**

Other Fincor Voltage Regulators are available for use with generators needing up to 5 kw field power.

**FINCOR**

**FIDELITY INSTRUMENT CORPORATION**

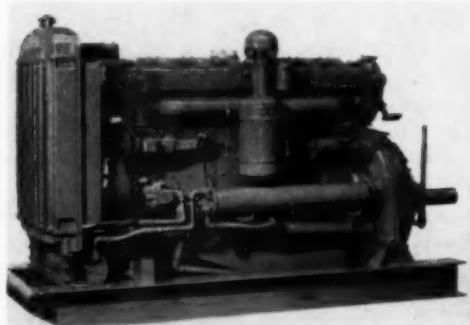
1000 EAST BOUNDARY AVENUE • YORK, PENNSYLVANIA

F-33/60



## MP Series Of Murphy Engines

Murphy Diesel Co., Milwaukee, has announced an MP series of diesel engines and generator sets. According to Murphy, MP Series engines are designed to give good reaction to load changes and



speed changes. It is claimed the MP series diesels have the high rising torque necessary to keep equipment at the right operating speed for efficient production. Murphy Diesel MP series engines and power units are available in sizes from 105 hp to 320 hp. MP Series generator sets are available in capacities from 60 kw to 188 kw. Dual-fuel models and Mech-Elec units, capable of delivering mechanical and electric power simultaneously, are also available. A 48-page booklet entitled "Before You Power a Job" describes the design and construction of MP series Murphy Diesels. Copies are available from Murphy Diesel Co., 5317 W. Burnham St., Milwaukee 19, Wis.

ITS NEW

## Diesels Support Jetliners

TRANS World Airways has purchased about a dozen Leach Corp. diesel driven ground power units, model TMD100, mounted on a General Motors truck for use as ground support power units while the TWA jetliners are on the ground. These generating units are powered by a model NHS6BI turbocharged Cummins diesel engine having a bore and stroke of  $5\frac{1}{8} \times 6$  in., piston dis-



placement of 743 cu. in. and developing 290 max hp at 2100 rpm and a cont. hp of 192 at 1800 rpm. This 6 cyl. diesel weighs 2660 lbs. and has a 140 kva, 115/200 volt, 3 phase, 400 cycle generator, Leece-Neville starter and generator and Penn safety alarm system for low oil pressure and high water temperature. To illustrate a typical use, the Boeing 707 Jetliner arrives in Miami from California at 10 pm each night. The power unit is hooked up to the plane until 8:30 a.m. the next morning. During this time the generating unit supplies power for the plane's lights, radio, refrigerator and air conditioning. Fuel consumption runs 47 to 48 gals. per 10 to 11 hr. day. A Woodward governor is used on the engine.

APRIL 1960

# QUALITY THAT PRODUCES TOP PERFORMANCE



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HEAT TRANSFER DIVISION

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703 4th St. BELOIT, WISCONSIN

## Mid-West Diesel News

By L. H. Houck

**YELLOW** Transit Freight Lines, Kansas City, has converted three short run trucks to GM 4-53 diesels from gasoline. Engines were sold by Kansas Diesel Power Co., and installed in the Baxter Springs, Kan., shops of the line.

**INGERSOLL-Rand** 365 Gyro-Flo air compressor powered with a 4-71 GM diesel to George Ferguson Drilling Co., Tulsa, from Tulsa office of Victor L. Phillips Machinery Co.

**SOUTHLAND Tractors, Inc.**, Memphis, has been appointed dealer for South Bend Division of Curtiss-Wright Corp., for its line of construction equipment

and Curtiss-Wright diesel-equipped self-propelled scrapers.

**BURLINGTON Truck Lines, Inc.**, Galesburg, Ill. has added 50 International DCOF-405 diesel tractors to its fleet. The new units will pull 40 ft. trailers from points in Missouri, Iowa and Nebraska to Chicago.

**INTERNATIONAL** dealers are getting a good reception to the new idea in mobile welding units—the TD-15-500-1. Crawler tractor has 120 hp 6-cylinder International diesel, which also drives two Lincoln 325 amp. Lincoln welders which can accommodate four welders working at one time. Designed especially for pipeline work, the new rig may have wide application in the construction industry.

**DEWEY Portland Cement Co.**, Dewey, Okla., 600 cfm Ingersoll-Rand Gyro-Flo compressor with 6-71 GM diesel from Victor L. Phillips Co., Tulsa.

**OBSERVED:** J. M. Corbett Co.'s International Drott TD-15 4-in-1, removing timbers from abandoned street car line to make way for a new street near Congress Expressway, Chicago.

**INLAND GM Diesel, Inc.**, Milwaukee, sold and installed a 4-71 GM diesel in a FWD truck owned by town of East Troy, Wisconsin.

**NEW 4-71 GM diesel** for Cedarapids crusher owned by Paul Polenska, Manchester, Wis., from Inland GM Diesel, Inc., Milwaukee.

**CONTRACT** for 180 International TD-20 crawler tractors with International diesels, has been awarded IHC by Corps of Engineers, U.S. Army, for \$3,196,654. Each unit will be equipped with International cable-control bullgrader blades. Rear-mounted IHC P-29 winches will be installed on 144 units and Carco G-4 winches on 36. The 134 hp units will be manufactured in the Chicago plant.

**SMITH Grain Co.**, Limestone, Tenn., has purchased 75 GMC Model DFR-8009, 189 hp V-6 diesel tractors with sleeper cabs, all aluminum tilt-type, air suspension and fabricated frames.

**McELROY-ROLAND Machinery Co.**, distributors for International Harvester, Hough, Galion, Gardner-Denver and other construction equipment, has occupied its new plant on U.S. 66 by-pass, Springfield, Ill.

**HUSMANN & Roper Freight Lines, Inc.**, St. Louis, has added 16 International DCOT-405 tractors with 195 hp diesels, and 10 speed Fuller R-96 Road-

Ranger transmissions to its 155 unit fleet.

**MCLENNON Drilling Co.**, Tulsa, has taken delivery on a 600 cfm Ingersoll-Rand air compressor with 6-71 GM diesel from Victor L. Phillips Co., Tulsa.

**ADAMS Machinery Co.**, Milwaukee, has repowered an A-W grader with a 3-71 GM diesel from Inland GM Diesel, Inc.

**OBSERVED:** El Paso County, Colo., operates its own gravel plant near Colorado Springs. It uses an International TD-20 crawler with an angle dozer blade to push rock into crusher with some pushes 100 yds. long. Gravel production runs 1000 cu. yds. per hr. and material stockpiled is for later use as road base material.

**TWO Model 399 American cranes** with 3030 GM diesels to ABC Construction Co., Tulsa, from Victor L. Phillips Co., American dealers.

**TRAXLER'S Feed Service**, Whitewater, Wis., has purchased a 4-71 GM diesel power unit from Inland GM Diesel, Inc., for a Daffin feed unit. Inland made the installation.

**WILLIAMS Tractor Co.**, Paducah, Ky., Allis-Chalmers dealer, has moved into a new branch plant at 3315 Park, U.S. 50, with 64,000 sq. ft. of floor space.

### Voltage Regulator Bulletin

Bulletin 3200, "Fincor" model F-26 series, describes a line of voltage regulators for ac generators and generator-excitors. There are four models currently available, three with selenium rectifiers and one with a sealed silicon rectifier for corrosive atmospheres. Each regulator is of the tubeless magnetic amplifier type; static construction permits operation in locations where conditions of high shock or vibration are encountered. The four-page bulletin is available from Fidelity Instrument Corp., 1000 E. Boundary Ave., York, Pa.

ITS NEW

### GM Diesel In Record Year

The Detroit Diesel Engine Division of General Motors has announced that sales of GM Diesel engines in 1959 reached the highest level of any year in the division's peace-time history. Clyde W. Truxell, general manager, reported engines shipped during the year represented a total increase of 2,000,000 hp over 1958. This was due, he said, largely, to product improvements and a widely expanded line of engines announced early in 1959. The year's output boosted the accumulated horsepower of engines manufactured by the Division since its establishment in 1938 to over 85,000,000.

## Clayton DYNAMOMETERS INSURE PEAK PERFORMANCE OF RYDER TRUCK RENTAL UNITS



## RYDER LEASED TRUCKS "WEIGH-IN" REGULARLY TO CHECK PERFORMANCE

More than 17,000 truck units operated in over half the fifty states of the nation by Ryder Truck Rental, are tested periodically on the Clayton Dynamometer. This determines if each unit is operating at peak performance under all conditions. Ryder also uses the Clayton Dynamometer to test overhauled units under accurately simulated road driving conditions before being returned to service. After-service checks prove service workmanship; allow fine tuning to desired power ranges for maximum efficiency.

Clayton Chassis Dynamometer installation at 5-acre "model shop" operated in Miami, Florida, by Ryder Truck Rental for maintenance of 1100 vehicles in Miami District. The plant is a prototype for proposed Ryder shops in other cities.



After periodic engine overhauls, all Ryder Truck Rentals units are subjected to rigid indoor road tests on the Clayton Chassis Dynamometer to test engine under actual power load conditions before being restored to road service.

## Clayton CHASSIS & ENGINE DYNAMOMETERS

CLAYTON MANUFACTURING COMPANY  
443 N. Temple City Blvd., El Monte, California

307



## SAE Earthmoving Conference

The Central Illinois Section of the Society of Automotive Engineers will hold its 11th Annual Earthmoving Industry Conference on April 5 and 6. Headquarters will be at the Pere Marquette Hotel in Peoria, Ill. Technical sessions will be held in the Madison Theatre which is directly across the street from the Pere Marquette Hotel. It is expected that between 1500 and 2000 SAE members and guests involved in construction work and design and manufacture of earthmoving machines will attend the conference.

### 11th ANNUAL EARTHMOVING INDUSTRY CONFERENCE

Central Illinois Section—Society of Automotive Engineers

April 5th and 6th 1960

Pere Marquette Hotel, Peoria, Illinois

#### TUESDAY MORNING—April 5

8:00 A.M.—Registration—Pere Marquette Hotel

9:30 A.M.—Madison Theatre

Welcome . . . M. C. Neul, Chairman of Conference

Technical Chairman—E. E. Isgren, Executive Vice President, LeTourneau-Westinghouse Co.

"Construction Machinery Requirements of the Corps of Engineers"

Lt. General E. C. Ischner, Chief of Engineers, United States Army

"The A.A.S.H.O. Road Test Technicalities"

W. E. Chastain, Sr., Chief Engineer for Research

A.A.S.H.O. Road Test, Ottawa, Illinois

#### TUESDAY AFTERNOON—April 5

1:30 P.M.—Madison Theatre

Technical Chairman—D. W. Erskine, Assistant Chief Engineer, Allis-Chalmers Manufacturing Co.

"High Durability Electrical Equipment for Earthmovers"

W. C. Edmundson, Executive Engineer, Delco Remy Division, General Motors Corp., Anderson, Indiana

"Role of Computers in Earthmoving"

Basil Mikhalkin, Senior Application Specialist, Bendix Computer Div., Bendix Aviation

Corp., Los Angeles, California

"Electrical Remote Control Systems"

J. T. Osterman, Electric Prod. Divisions, Electric Auto-Lite Co.

"Diesel Engine Cold Starting"

L. P. Atwell, Product Manager, Spark Plug Division, Electric Auto-Lite Co.

#### TUESDAY EVENING—April 5

5:30—6:30 P.M.—E.M.A. Cocktail Party (Admission by Ticket Only) Ballroom Pere Marquette Hotel

6:30 P.M.—E.I.C.—Annual Banquet—Pere Marquette

Toastmaster . . . R. W. Rand, Chairman

Central Illinois

Dinner Speaker . . . Senator Jennings Randolph

#### WEDNESDAY MORNING—April 6

9:00 A.M.—Madison Theatre

Technical Chairman—W. J. Lux, Supervising Engineer—Engine Evaluation, Research Department, Caterpillar Tractor Co.

"Developments and Potential Applications of the Gas Turbine"

L. J. Nuttall, Small Aircraft Engine Dept., General Electric Co., West Lynn, Mass.

"The Fuel Cell Power Plant"

Dr. H. K. Ihrig, V.P. in Charge of Research, Allis-Chalmers Manufacturing Co., Milwaukee, Wisconsin

"The Place of the Gas Turbine in Off-Highway Equipment"

W. J. O'Connor, & J. M. Stephenson, Lycoming Division of Avco Corp.

#### WEDNESDAY AFTERNOON—April 6, 1960

1:30 P.M.—Madison Theatre

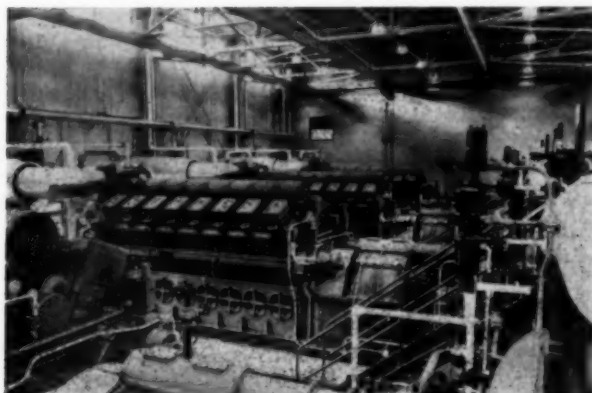
Technical Chairman—D. K. Heiple, Chief Field Engineer LeTourneau-Westinghouse Co.

"Earthmoving Equipment Requirements for the Next Decade"

Panel Discussion by prominent Contractors

## Oil & Gas Power Meeting

The 32nd annual conference and Exhibit of the ASME's Oil & Gas Power Division will be held on May 22 through 26 at the Hotel Muehlebach in Kansas City, Mo. J. T. Adams is chairman of the conference, which will have "Economies of Engine Power" as its theme. Manufacturers interested in exhibiting can write to John E. Onnen, Koppers Co., 122 S. Michigan Ave., Chicago 3, Ill.



## NORDBERG DIESELS AND KITTELL SILENCERS... An efficient power team!

Kittell's unique louvred design stops damaging back surge. As exhaust gases enter the silencer they are instantly bled off by a special perforated tube, then directed through louvres along the outer shell which cools them and reduces their volume. More louvres guide them back into the center of the silencer and then out into the atmosphere. This efficient design smooths pulsations, produces a whisper-quiet, exhaust flow. Available in a variety of sizes and designs for every noise application. Write for catalog.



**Kittell**

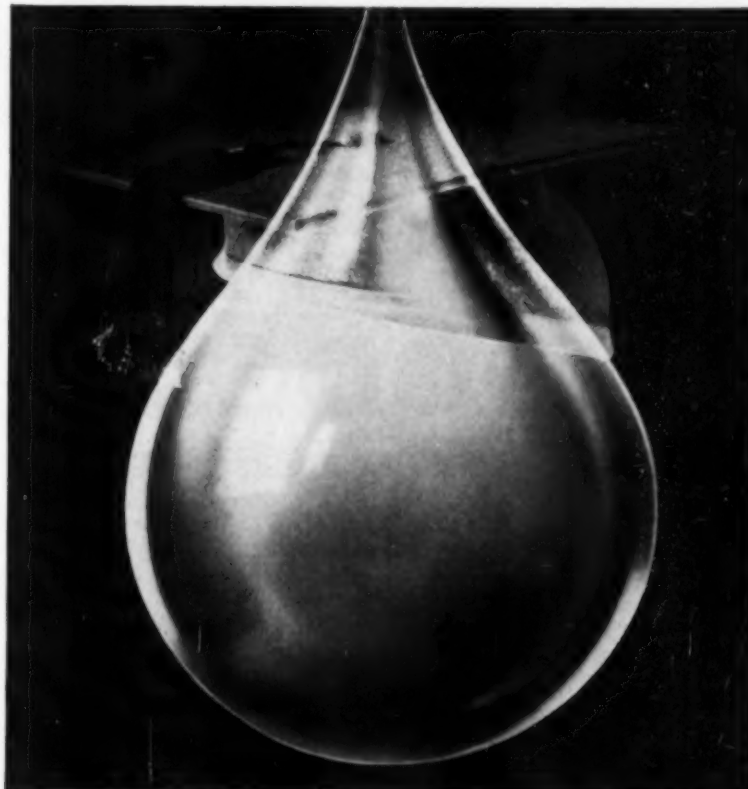
KITTELL MUFFLER and ENGINEERING, 1977 Blake Ave., Los Angeles, Calif.  
17 years of experience in SILENCE!

## Pipeline Cleaning Process

A revolutionary process of cleaning the inside of a buried six in. petroleum pipe line, three mi. long by a gas turbine was successfully demonstrated in Wallisville, Tex. Power plant for the experimental sandblasting demonstration was a model 105 gas turbine produced by The Garrett Corp.'s AiResearch Phoenix

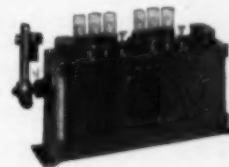
division. It took slightly more than two hours time. The process developed less than a year ago by the Klean Kote Co. of LaPorte, Texas is accomplished by a sand washing of the walls of the pipe. Sand under propulsion and suspended by the air stream, produces pore penetration followed by surface polishing. Mill scale, oil, paraffin, carbonates and rust are removed.

# HOW TO educate



## a drop of oil!

Just put it through a Manzel force-feed lubricator and any oil drop knows where it's going and how to get there fast. Manzel lubricators deliver just the right amount of oil to bearings, cylinders and packings. They start, stop, speed up and slow down in perfect synchronization with your machinery...unaffected by high steam, gas or air pressure. Whatever your field, there's a Manzel lubricator to meet your needs. For our catalog, write Manzel, 253 Babcock Street, Buffalo 10, New York. Whatever your lubricating problem, you get the right answer if you



ask the man from



**Manzel**

SPECIALISTS IN LUBRICATORS AND METERING PUMPS SINCE 1898

## Michigan-Ohio News

By Jim Brown

**WOLVERINE** Tractor & Equipment Co. of Detroit and Grand Rapids reports sale of an International TD-15 bulldozer equipped with a hydraulic dozer blade. The new tractor was purchased by Redford Excavating Co., Detroit.

**MICHIGAN** Tractor & Machinery Co. of Detroit exhibited a new Caterpillar engine in the Detroit Boat Show March 19th-27th. The new "Cat" diesel is rated at 130 hp at 2400 rpm and is small enough to work out successfully in boats of 27 ft. and up. Other dimensions are: length-33.1 in.; width-28.6 in.; height-34.8 in. The exhibit displayed a cutaway model of a 35 ft. boat with the engine in place.

A model 240 Pettibone-Mulliken front

end loader with 2 1/4-yd. bucket and Hercules 339 diesel engine was recently sold to the city of Garden City, Michigan. The sale was made by Cyril J. Burke, Inc.

**ERNEST** Harris of Allegan, Mich. has a new GM series 53 diesel engine (model 5043-7101) in his model 153M Thew-Lorain loader (1-yd. capacity). The new engine was sold by Peninsular Diesel Inc. of Detroit and replaced the former gasoline engine.

**JERRY** Stanlake of North Adams, Mich. has accepted delivery on a HD11E Allis-Chalmers diesel tractor with hydraulic dozer blade. Mr. Stanlake purchased the unit from Earle Equipment Co. of Detroit and will break it in on logging operations and in the oil fields in Hillsdale County, Mich.

**CARR** Bros. of Albion, Mich. have replaced a gasoline engine with a GM

model 5033-5101 diesel engine in their Insley "K" (1 1/2-yd.) crane. The "Jimmy" was supplied by Peninsular Diesel Inc. of Detroit.

**H. H. Shinville** of Kalamazoo, Michigan is the owner of a new model 160 Galion motor grader. The grader is equipped with bulldozer blade, scarifier and has a hydraulic "shiftable" moldboard. The unit weighs 30,020 lbs. with dozer blade, is completely hydraulic and is powered by a Cummins H6-D1 diesel engine. The sale was made by Wolverine Tractor and Equipment Co.

**ADVANCE** Contracting Co. of Detroit has accepted delivery on an International model TD-15 bulldozer. Sale was made by Wolverine Tractor & Equipment Co.

A Deutz diesel engine was recently sold to A. Lindberg of Bergland, Mich. The engine is a model FIL-712 1-cylinder rated at 9 hp at 1800 rpm. The sale was made by David A. MacPherson, an agent for Marine and Industrial Engine Division of Chrysler Corp. Mr. MacPherson is located in Iron River, Mich.

**RAYMOND** Santee of Indster, Mich. has installed a GM Model 5047-7240 in his Ford 5-750 truck. The new diesel was supplied by Peninsular Diesel Inc.

**WILLIAM** Velting & Sons of Grand Rapids have accepted delivery on a new International model TD-6 bulldozer. The new 'dozer will be broken in on a road-building project and was supplied by Wolverine Tractor & Equipment Co.

**JAEGER** Machine Company of Columbus, Ohio has introduced a rotary air compressor which delivers 900 cfm of air at an operating speed of only 1700 rpm. It is powered by the Model 6-110 GM Diesel engine. The reduction of rpm in engine speed results in a fuel factor of more than 500 cfm of delivered air per pound of fuel consumed.

A Pettibone-Mulliken model 125 front-end loader with a 1 1/2-yd. bucket capacity and Hercules DD339 diesel engine was recently delivered to the Dunnigan Brothers of Jackson, Mich. The new loader will be used on pipe laying and sewer work and was purchased from Cyril J. Burke Inc.

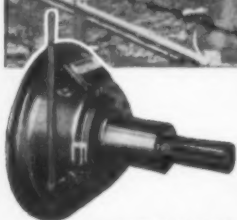
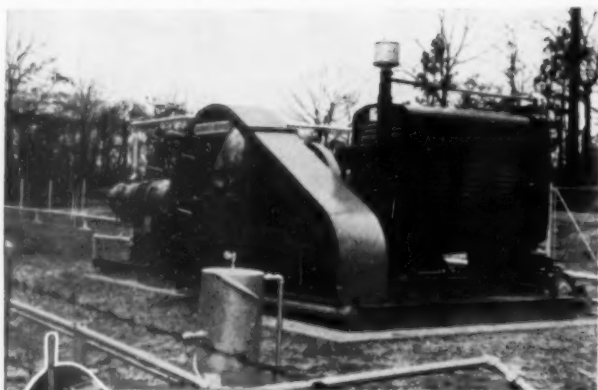
**HENRY** Koster of Jenison, Michigan has accepted delivery on a International model TD-6 bulldozer. Sale was made by Wolverine Tractor & Equipment Co.

**FOURTEENTH** Avenue Cartage Co. of Detroit has recently replaced a gasoline engine in their White model 3000 truck with a model GM 4171E diesel engine. The sale was by Peninsular Diesel Inc.

A Northwest model 41 with a 1-yd. backhoe and powered by a Murphy diesel engine was recently delivered to Advance Construction Co. of Detroit by Cyril J. Burke, Inc.

**ADVANCE** Construction Co. of Detroit has accepted delivery on a Model 6 Northwest with a 1 1/4-yd. bucket and powered by a Murphy diesel engine.

## ROCKFORD



### GARDNER-DENVER USES ROCKFORD POWER TAKE-OFFS for RELIABILITY and SERVICE

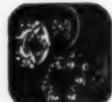
This Gardner-Denver installation is serviced by a reliable ROCKFORD POWER TAKE-OFF. High quality materials and precision workmanship are two important factors that control "reliability and service." Careful attention must be given to both factors for longer life and greater efficiency. For complete customer satisfaction, ROCKFORD CLUTCH uses only the finest of carefully heat treated steels and the application of the research department's advanced technology on the plate facings. Expert machining, using precise calibrations, gives ROCKFORD CLUTCHES additional life and better service. For more satisfied customers, specify ROCKFORD CLUTCHES.

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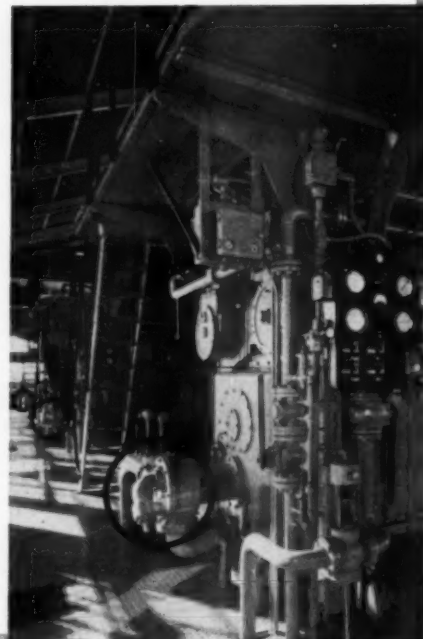
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See Our Catalog in Sweet's Industrial Construction and Plant Engineers File





Sale was made by Cyril J. Burke Inc. of Detroit.

THE Thew Shovel Company of Lorain, Ohio announces the introduction of a 65-ton Lorain model MC-760 Moto-Crane on an all new carrier. The carrier is constructed with a new welded box-section chassis frame 22 in. deep, and has a 40 ft. basic boom. Additional boom sections give the crane a maximum reach of 170 ft.

## Florida Diesel News

By Ed Dennis

CATERPILLAR'S new D333 marine diesel engines were installed in the twin screw, 65 foot yacht, *Nautilus* of Fort Lauderdale. The pair are rated 270 hp each at 2200 rpm and have Twin Disc 2.95:1 r&r gears. Shelley Tractor & Equipment Co., of Miami, supplied the engines, (see Diesel Progress Feb. 1960 for more specifications on these new Cat diesels).

TO fit into Pan American Airways new jet plane program at Miami, PAA took delivery of a self-propelled Hobart motor generator powered with a model C160-BI Cummins diesel to supply power for the vehicle and to supply power for the Hobart 60 kva 120/203 volt 173 amp 400 cycle at 1714 rpm generator.

FLORIDA-Georgia Tractor delivered to the Dade County Commission, three TD24 International crawler tractors with 190 net hp International diesel engines. A similar model went to Symonette of Nassau in the Bahamas.

OVER near Punta Gorda the Coastline Construction Co. is moving about six million cu. yds. of gumbo clay in a land reclaiming project. One of the dieselized pieces of equipment being used is an Allis-Chalmers TS-360 scraper, with a 20 cu. yd. heaped capacity powered by a model TDS 844 Allis-Chalmers, 6 cyl 4 cycle diesel rated 280 hp.

RED Wing Carriers have a Cummins NH180 diesel naturally aspirated engine, rated 180 hp at 2100 rpm with a Fuller transmission, to power a White 4400 tractor for hauling highway tankers. A Perry water filter was also included.

A General Motors 4-53 diesel engine with Paragon 3:1 r&r gears replaced a gasoline engine on the house boat *Topsy*, from Miami Br. of Detroit Diesel Div. G. M.

UP at Jacksonville, the Southern Marine Co. launched the 73 ft. *Prudence B*, a yacht displacing 65 tons, owned by Dexter L. Lewis, powered by a pair of

D318 Caterpillar marine diesels rated 90 cont hp at 1800 rpm and Twin Disc 3:1 r&r gears.

ANOTHER magnificent Norseman, Chris built yacht was launched at Chris Boat Works. It was hull #2114 and christened the *Maggie I*. This sharply flared 52 ft. craft is powered by a pair of General Motors 6-71 diesel engines and G. M. 2:1 hydraulic r&r gears for a cruising speed of 17 knots and a potential top of 21. Jack Rau is the owner.

A 350 kw Waukesha Enginator generating unit for the North District Hospital at Pompano Beach powered by a model LRDBCSU Waukesha diesel engine. This six cylinder 6 1/2 x 6 1/2 turbocharged diesel is rated 655 hp at 1200 rpm and has a 277/480 volt Electric Machinery generator from Simplex Sales in Miami.

THE Florida Georgia Tractor Co. at Tampa delivered to J. W. Connors & Sons a Pettibone-Wood model P80 speed mixer bore stabilizer powered with a International UD18 diesel having a max. hp of 150 at 1600 rpm.

OVER at Nassau in the Bahamas, Bruce Parker repowered his 43 ft. shrimp trawler with a model JN-6-M Cummins. This diesel engine has a work boat cont hp of 86 at 2200 rpm. Also included was Capital 2:1 r&r gears.

SIX Cummins diesels, model HR6P and rated 130 cont hp, were installed with Twin Disc SP214 clutches and Lennon 42 in. low lift pumps, engineered and sold by Jack Lennon of Lake Placid for Tropical Farms to make a total of eight Cummins dieselized pumping units on this farm.

TWO Allis-Chalmers HD16 crawler tractors with dozer blades being used by R. H. Wright on the new North-South Highway being constructed in Miami. These are powered by a model 16000 Allis-Chalmers 163 max. hp diesel. Also working on the same project is a model HD15 A-C dozer.

DOWN in Key West Thompson Enterprises repowered a crayfish boat with a JT6-M Cummins diesel 115 hp at 2200 rpm and Capital 2:1 r&r gears.

POWERED with International UD282 diesel engines 95 hp at 1800 rpm and Allison torque converters are two Galion road rollers which were delivered to Dade Metro Commissioners for road work from Florida-Georgia Tractor Co. of Miami.

OVER at Chipley, the Tri State Contracting Co. is using a pair of S12 Euclid hydraulic road scrapers. These are powered with General Motors 6-71 die-

sel engines rated 218 hp at 2100 rpm and Fuller transmissions for their various road construction jobs.

THE Miami Branch, Detroit Diesel Div., GM repowered from gasoline to diesel a WC22 White dump truck for Wilson & Hopper Crush Stone with a GM 4-53. This new diesel has a bhp of 130 at 2800 rpm. A similar installation was made in a White highway tractor for E. E. Collins Construction Co.

TWO Michigan No. 380 tractor dozers, one to Cone Bros., Tampa and one to Sanderson of Tampa. These are powered with Cummins turbo charged model NFT-6-BI diesels max. hp 375 at 2300 rpm. They have a Clark 3.0:1 torque converter and Clark transmissions and axles.

TWO Caterpillar model D8 tractors were delivered to Troup Bros., road contractors, by Shelley Tractor & Equip-

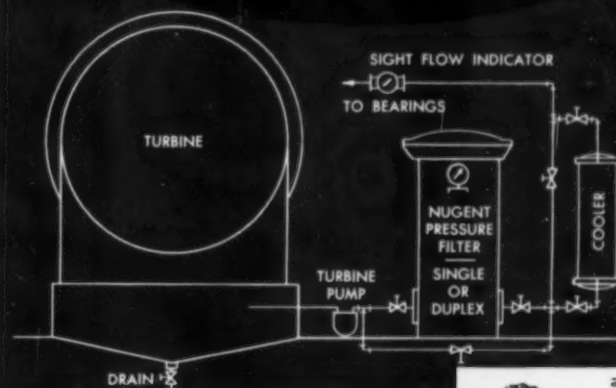
ment Co. These are powered with 191 hp Caterpillar diesel engines. The same firm also delivered two No. 12 Motor Graders to David Woolin of Perrine. These are powered with 115 hp Cats.

CUMMINS Diesel Sales Corp. repowered, at their Hialeah shops, a White highway tractor for Edwards Produce Co., with a Cummins C175 turbocharged diesel. This new diesel is rated 175 hp at 2500 rpm. A Fuller transmission was included in the installation.

## Garrett Forms Subsidiary

Formation of a subsidiary company, Garrett (Japan) Ltd., in Tokyo, has been announced by E. A. Bellande, vice president of foreign operations for The Garrett Corp., Los Angeles. At the same time appointment of Seichi Akabane as resident representative managing director of Garrett (Japan) Limited has been announced.

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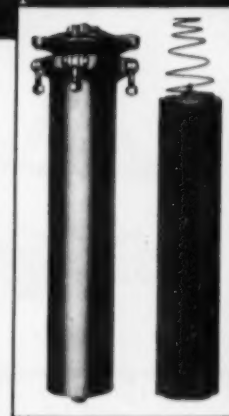


Fig. 1555-4L filter and laminated disc cartridge provide excellent micron efficiency.



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## HOSE ASSEMBLIES

**SF 211** — Shown above, left, the all-purpose, single wire braid hose assembly suitable for universal industrial applications. Withstands temperatures from  $-40^{\circ}\text{F}$  to  $250^{\circ}\text{F}$ .

**SF 213** — Shown above, center, the lightweight single wire braid, fabric covered hose assembly designed for hot engine oil and fuel lines and many other applications. Withstands temperatures from  $-40^{\circ}\text{F}$  to  $300^{\circ}\text{F}$ .

**SF 224** — Shown above, right, the high temperature stainless steel wire braid covered Teflon hose assembly, designed for chemicals, petroleum or synthetic base lubricants, acids, solvents, steam service and hot asphalt lines. Withstands temperatures from  $-65^{\circ}\text{F}$  to  $450^{\circ}\text{F}$ .



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SF9-0

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### Worthington Vice-President

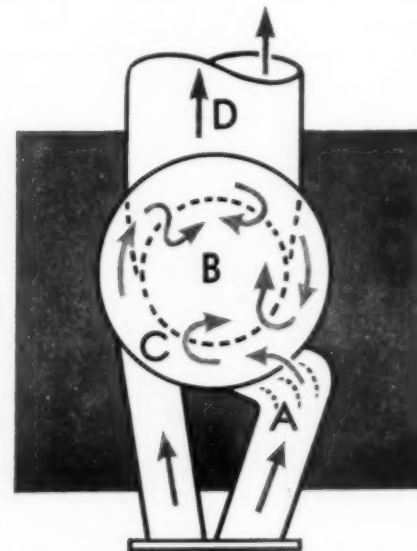


A. W. Fraser

The Board of Directors of the Worthington Corp., has elected A. William Fraser a vice president and general sales manager. Mr. Fraser was formerly general marketing manager. Mr. Fraser, a mechanical engineering graduate of Northwestern University, joined Worthington in 1929 as a sales engineer. He was district office manager in Chicago from 1937 to 1945 when he went to Paris as general European manager. He returned to Chicago in 1951 as midwest regional sales manager, where he remained until he was appointed general marketing manager in 1957.

### Diesel Locomotive Spark Arresters

A spark arresting system which prevents large, hot particles from escaping through the exhaust manifold of diesel locomotives is manufactured by the Farr Co. No screens or other devices which block the exhaust flow are required. The Spark Sentry is said to not only eliminate the hazard of flying sparks but also reduce back pressure on the engine. The Far-Air Spark Sentry circulates hot



particles within the exhaust manifold until they disintegrate. Creation of a cyclonic type of gas flow within the manifold also reduces back pressure on the engine substantially. Principal parts of the arrester are (A) the curved inlet elbows that connect the bank of cylinders to the exhaust manifold and (B) the exhaust tee. The curved manifold legs with their turning vanes cause the hot exhaust gases to spin in a uniform cyclonic manner in the manifold (C) rather than the usual turbulent flow. This cyclonic action holds the hot carbon particles to the outer perimeter of the manifold where they rotate until they burn out. The exhaust tee (B) allows only the spark-free gases in the center of the manifold to be exhausted. The exhaust tube is of such diameter as to prevent sparks from entering the stack (D). The arrester system is available for field installation or factory reworked manifold form. For more information write the Farr Co., P.O. Box 90187, Airport Station, Los Angeles 45, Calif.



## Cooper-Bessemer Names New Chairman, Two New Vice-Presidents



L. L. Warriner

Election of L. L. Warriner as Chairman of the Board of The Cooper-Bessemer Corp., was announced by the company's board of directors. At the same time, E. L. Miller, Cooper-Bessemer's president and chief executive officer, announced that Grant C. Woodard, general sales manager and Harold C. Johnson, manager of manufacturing, were elected vice-presidents of the company. Mr. Warriner was elected chairman upon the recommendation of L. F. Williams whom he succeeds. Mr. Williams, who is stepping down from the chairmanship after more than 40 years' service with Cooper-Bessemer, will continue as a director and as a member of the executive committee. He first went to work for Cooper-Bessemer as a lathe operator in 1919 during vacations while attending Oberlin College. From this start he has held various positions, becoming president and general manager in 1955 and chairman of the board in 1957. Mr. Warriner, management and engineering consultant, has been a Cooper-Bessemer director for the past 15 years. His background includes work in high engineering and top executive posts with the Fairbanks-Morse Co., A. O. Smith Corp., Summitville Consolidated Mines and The Master Electric Co. He retired from the presidency of the latter company in 1956 to engage in his management and engineering consultant work and also is currently a director of The Winters National Bank and Trust Co., Dayton; The Monarch Machine Tool Co., Sidney, Ohio, The Huffman Manufacturing Co., Dayton, and Bowser-Morner Testing Laboratories, also of Dayton.



H. C. Johnson



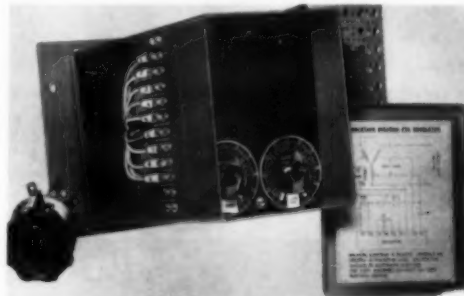
G. C. Woodard

Mr. Woodard, who now becomes vice president of marketing, graduated from Cornell University as a mechanical engineer in 1948 and joined Cooper-Bessemer as a sales department application engineer that same year. He became general sales manager in 1957. Mr. Johnson, who now becomes vice president of manufacturing, studied at both Dennison University and Ohio State University, graduating from the latter in 1932 as a chemical engineer. Before joining the Methods Department of Cooper-Bessemer in 1946, he was with the American Rolling Mills at Ashland, Ky.

### Voltage Regulator for AC Generators

This completely static voltage regulator is of the magnetic-amplifier type. Without tubes or other parts requiring periodic replacement, the "Fincor" F-26 may be used to regulate the output voltage of any 50-60 cycle generator or exciter requiring a dc field supply of up to 1.8 amperes at 125 volts

or less. It requires no warm-up period, is said to work as well at low-current levels as at full output and to give trouble-free service even in locations where high shock or vibration is encountered. Guaranteed regulation is  $\pm 1\%$ , but closer regulation is claimed with most generators. An input power of 208 to 240 volts, 60 cycles, is required. This may be obtained either directly from the generator output, through generator taps or from a transformer if 208-240 volts is not available. If desired, the regulated output voltage can be varied by an externally mounted rheostat. This is con-



nected either directly to the terminal strip or through a manual-automatic switch if it is necessary to allow temporary manual control of the generator voltage. The compact, lightweight unit measures 10 in. long by  $6\frac{1}{2}$  in. wide by  $9\frac{3}{8}$  in. high and is mounted to the generator by four  $\frac{1}{4}$ -in. bolts through its base plate. All connections are made to a terminal strip of the external screw type. For further information write Fidelity Instrument Corp., 1000 E. Boundary Ave., York, Pa.

ITS NEW

## New "Cat" Facility



Ground was broken recently for the new \$250,000 headquarters for Shelley Tractor & Equipment Co. on the new Palmento Bypass west of Miami International Airport. Representatives from the Caterpillar Tractor Co. and officials from the State Road Department, watched as Thomas R. Shelley, founder and president of Shelley Tractor & Equipment Co. bulldozed, with a new "Cat" D8 series H power shift tractor, the sand and rock for the firm's new sales and service facilities. The firm was established in 1939.

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## DIESEL FUEL AND LUBE OIL FILTERS AND CARTRIDGES

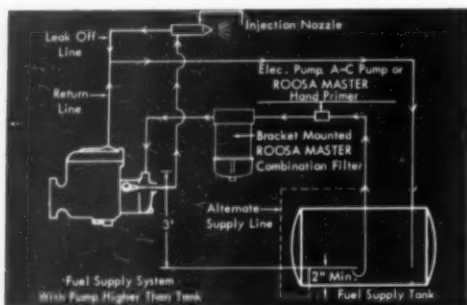
THE BRIGGS FILTRATION CO., DEPT. 335 WASHINGTON 16, D. C.



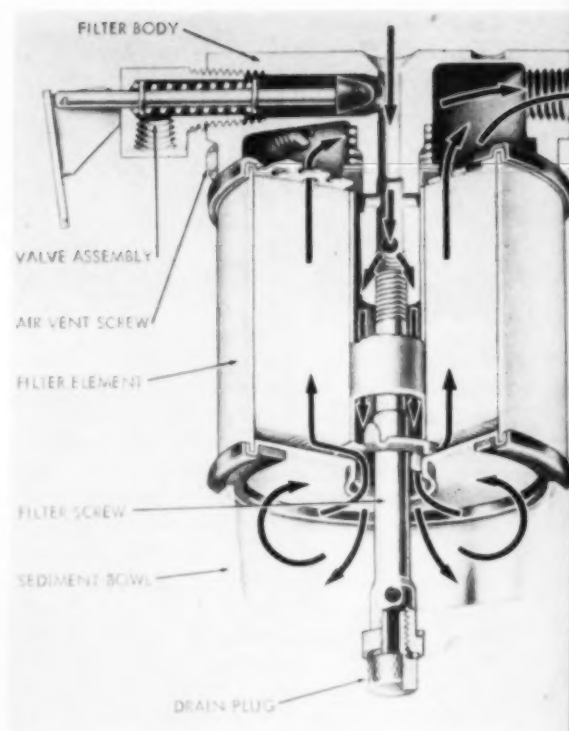
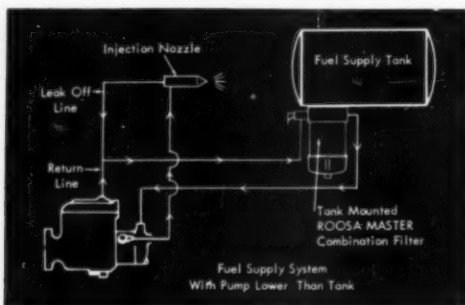
## NEW ROOSA MASTER FUEL FILTER ASSEMBLY

**A** NEW combination fuel filter assembly has been announced by Hartford Machine Screw Co. It incorporates the features of the standard Roosa Master fuel filter with those of a water trap. Under the filter element is a glass sediment bowl which enables the operator to see if water is in the fuel. A drain providing for release of accumulated water is at the bottom of the sediment bowl and an air bleed is provided at the top of the filter, in the filter body itself.

The combination filter is composed of three basic assemblies: The filter body, the element and the sediment bowl. There are two types of filter body



assemblies: one for bracket mounting, the other for mounting directly to the underside of the fuel tank. The filter element is the same as used in the standard Roosa Master fuel filter. A spiral paper construction of paper strips cemented at top and bottom to form a series of continuous V-shaped coils wound around a cylindrical core is contained in an air tight metal canister. This design provides approximately 560 sq. in. of filtering area. The transparent sediment bowl is made of a special, pyrex-type glass similar to that used in other automotive filter bowl applications. It is designed so that it can be removed from the assembly easily, without tools, for cleaning.



Cross section of new combination fuel filter assembly. Manually operated valve permits fuel to be shut off while changing element and provides connection for return oil line from pump so filtered fuel is not mixed with unfiltered fuel in the tank.

## STANDARD TRANSMISSION GRADER LINE

**A** NEW series of standard transmission motor graders has been announced by the Huber-Warco Co., of Marion, O. Designated as models 8-D, 9-D, 10-D and 11-D, the series offers three different makes of diesel engines in the various models. In addition, the line features a newly engineered standard shift transmission with pressure-flood lubrication.

The 8-D is powered by an International UD-370, which develops 83 hp; three 100 hp diesel engines are available for the 9-D . . . the International UD-14A, the General Motors 3-71 and the Cummins J-6-BI. Power for the 10-D can be supplied by either an International UD-554, a GM 4-71 or a Cummins NHC-4-BI. Each develops 125 hp. The 11-D, largest standard transmission grader ever offered by Huber-Warco, is powered by a Cummins H-6-BI which develops 160 hp.

Transmissions on the new grader lines have three forward and reverse speeds. Optional creeper gears give three additional speeds forward and reverse for precision grading or extra power needs. The operator can shift from forward to reverse and back by moving a single lever, travel in the opposite direction is in the same gear.

The transmission case is of cast steel, all gears and shafts are case hardened alloy steel. Lubrication is pressure-flood type to minimize damaged

bearings from prolonged engine idling in neutral. The engine exhaust stack has been installed lying flat to direct exhaust fumes and noise away from the operator. Fuel tank capacity is 65 gals.

The circle drive on the Huber-Warco line is now gear driven and has new gear case housings. Ball joints on the scarifier, circle lift and cross-shift arm now have a larger neck.

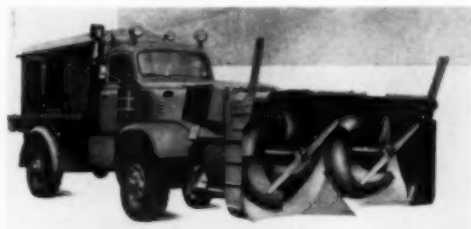
One of new line of Huber-Warco standard transmission graders at work. This model, 11-D, the largest produced by the firm, is powered by a Cummins H-6-BI diesel engine which develops 160 hp. Other graders in the series use engines by Cummins, GM and International.





## Cummins Engines Power Swiss Snow Plow

A pair of Cummins diesel engines power a new rotary snow plow unit being marketed in this country by Robert Aebi AG, of Zurich, Switzerland. Designated the Beilhack HS 14, the plow was developed for clearing airport runways as well as highways and can cast snow up to 160 ft. The plow is mounted on a Four Wheel Drive 327 D truck chassis powered by a Cummins HRB-600 engine. This engine, rated 165 hp at 1800 rpm, drives the unit up to a maximum 31 mph through a FWD 5C720 transmission and a Cotta 1.19:1 auxiliary transmission. Minimum speed is .046 mph at 1800 rpm.



A Cummins NRTO-6-IP turbocharged diesel engine 245.1 hp at 1800 rpm mounted on the chassis drives the blower rotors. Power is transmitted through a Twin Disc 14 in. three plate clutch to a three speed transmission built by Zahnradfabrik Friedrichshafen A.G. Blower speeds of 150, 300 and 450 rpm give casting ranges of 50, 90 and 160 ft. respectively. Snow casting tonnage is 40, 29 and 20 tons in low, medium and high range.

Power from the blower engine transmission to plow heads is through three shafts with universal joints. The Twin Disc clutch is operated hydraulically by means of a pump connected to the blower engine. Also hydraulically operated is the plow head lift and mechanism that swings snow discharge chutes to right or left of the truck. The Beilhack plow is equipped with newly designed augers which are said to eliminate clogging of snow passages because the discharge area is larger than the scooping area. The auger both scoops and discharges the snow through the discharge chute.

## En-Tronics Division Appointments

Frank L. Friedli has been named manager, and Reed D. Hamilton, assistant manager, of The Cooper-Bessemer Corp.'s En-Tronic Controls Division, Mount Vernon, Ohio. The En-Tronic Controls Division was formed by Cooper-Bessemer in December, 1957, in anticipation of a strong trend to automation in the fields of power and air and gas compression. All En-Tronic sales and product engineering will now be under the direct supervision of Friedli and Hamilton. In his new position, Friedli will have primary responsibility for sales activities of the division. He has been with the company since 1940, serving in sales engineering and executive capacities. Most recently he held the title of assistant sales manager for special projects. As assistant division manager, Hamilton will have primary responsibility for engineering activities of the division. He began his affiliation with Cooper-Bessemer during World War II as a naval officer in charge of the diesel engine shop



F. L. Friedli



R. D. Hamilton

and parts. After the war, he coordinated a number of special marine engine projects with the company. Most recently he has been manager of Engineering for the Electronics and Controls Department.

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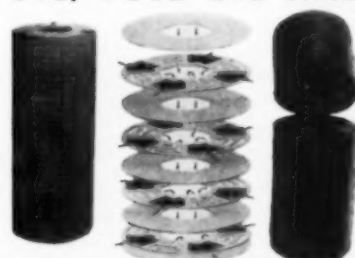


# HILCO® FULL FLOW FILTERS

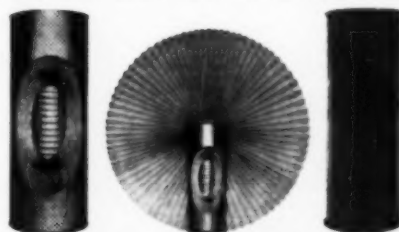
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LUBRICATING OIL, FUEL OIL AND GAS FUEL...

*with these features:*

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- ✓ Low pressure drop
- ✓ Choice of filter cartridges
- ✓ Large dirt storage area
- ✓ All steel welded construction
- ✓ In-out pressure gauges
- ✓ Quick action cover lifter
- ✓ 100 psi standard design pressure  
Higher pressures upon specification
- ✓ Swing bolt cover construction



HILCO FILTER CARTRIDGE TYPE FW-718 COMBINATION  
EXTENDED SURFACE AND DEPTH MICRO FILTRATION



HILCO FILTER CARTRIDGE TYPE PL-718 EXTENDED  
SURFACE FOR EXTREMELY HIGH FLOW RATES




"F" Series  
HILCO HYFLOW  
OIL FILTER

HILCO FULL FLOW FILTERS  
Available in capacities up  
to 2000 GPM and Micro Fil-  
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Smaller

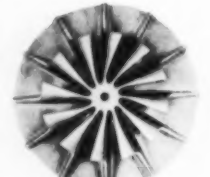
• Write to the PIONEERS of  
Micro Full-Flow FILTRATION




**THE HILLIARD CORPORATION**  
122 WEST FOURTH STREET  
ELMIRA, NEW YORK



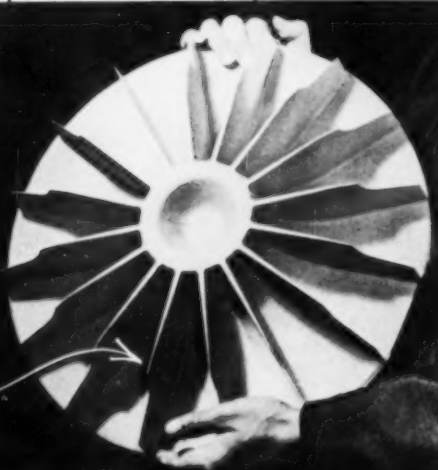
One-piece precision forging eliminates hogging, welding.



Precision turbine wheel is one-piece Arcturus forging.



Arcturus forgings cut the price of jet engine fins 38%.



**LOOK at the THIN WALLS**

Aluminum impeller. Vanes 3" high, less than 1/16" thick.

## CAN THESE BE FORGINGS?

*Arcturus is  
Creating Forgings  
Said to be Impossible*

HERE'S ONE RESULT →



### PRECISION THIN WALLS AND DEEP DRAWS

Can these be forgings? They can — and are. Arcturus is creating forgings said to be impossible. How? Using remarkable new Arcturus forging techniques. The Result? Engineers are taking a long new look at the value and use of forgings. Strength? These new forgings are stronger because grain flow follows contours. Machining? It's reduced drastically — sometimes eliminated altogether. Materials? Most metals and high temperature alloys — 6150 steel; 19-9DL; A-286; M-308; Inco 901; René 41; 50% molybdenum — 50% tungsten; and others. How to get information? Send us your drawings and specifications.

FORGE AHEAD WITH

# Arcturus



MANUFACTURING CORPORATION

4305 Lincoln Blvd., Venice, Calif. • Phone: UPTon 0-2751

## Resonant Reed Frequency Relays

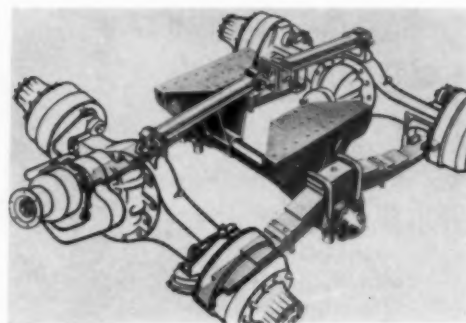
A complete line of resonant reed frequency sensitive relays is now available in the 400 cps and 60 cps ranges for applications such as over or under frequency cutoff, over or under frequency indication, sequence control for turbo starting, transfer switch operation, and engine overspeed. The frequency sensor consists of a tuned resonant reed driven by an electro-magnet connected to the frequency reference such as a 400 cps or 60 cps alternator or a tachometer generator. When the reference frequency resonates with the fundamental mechanical frequency of the reed the latter vibrates to close a set of contacts to pull in the self contained control relay.



Having no delicate electronic components or moving parts, these relays are said to hold their calibration indefinitely even under severe environmental conditions. Energy required for operation of the reed is less than 1 watt and the resonant frequency can be calibrated to 1%±. They can be furnished in either dust cover or hermetically sealed types and the standard models have SPDT contacts of 2 ampere capacity in either manual or automatic reset types. Single element relays weigh 12 ounces. Multiple element types are available for many special applications. For further information write Custom Built Controls, Inc. P. O. Box 1417, Denver 14, Colo.

ITS NEW

## New Tandem Suspension



A new lightweight tandem suspension unit for trucks and tractors has been announced by the Transmission and Axle Division of Rockwell-Standard Corp. It is claimed to be the most economical lightweight, true balance suspension available to the trucking industry. Available in two versions the all-steel unit provides weight savings up to 230 lbs. Equipped with aluminum frame support brackets and torque rods, an additional 80 lbs. may be saved. Unique design is said to require minimum maintenance and allow easy removal of either axle.

ITS NEW



## New Pump Backstop Device

The Hilliard Corp. has developed a new and unique backstop device for pump application which permits free rotation in a normal or forward direction and a positive backstop in the reverse direction. Well suited for diesel drives for



This view shows the stationary drum and shoe assembly. In normal rotation the shoes move away from the drum.

pumps, it prevents a rapid loss of water in a pump system in the event of failure of the driver; it prevents high speed reverse rotation in the event of failure of the driver when the pump is driven like a turbine under the effect of a head of water and it prevents dropping the pump shaft when it is coupled with a threaded coupling in the event of reverse rotation. Further information on this backstop device can be obtained by writing to The Hilliard Corp., 100 W. Fourth St., Elmira, N. Y.

ITS NEW

## International Tugboat Race



Within view of the crews of foreign and domestic freighters lining the Detroit shore, American and Canadian-owned tugboats get underway in the 10th annual International tugboat race on the Detroit River. The tugs are pictured as they emerged from the starting line and headed upriver toward the finish line opposite downtown Detroit. Winner of the race was the Detroit tug *Maine*, powered by a GM diesel engine, which covered the four mi. course in 17 min. Finishing a close second was the *G. F. Becker*, winner of last year's event. A Canadian entry, the *Chris-Ann*, finished third. The event, held in October, was sponsored by the Propeller Club of Detroit.

APRIL 1960

# VAPOR PHASE® PUTS ENGINE HEAT TO WORK, CUTS FUEL AND EQUIPMENT COSTS AT TIDEWATER'S VENTURA PLANT



Vapor Phase Units on each of eight gas engine compressors.

## BEFORE VAPOR PHASE®

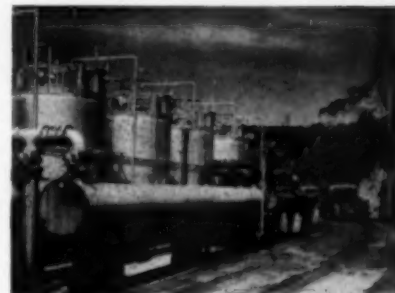
Power at the VLW Lease Gas Compressor Station consisted of eight Gas Engine Compressors of 2250 BHP total.

Engines were cooled by large radiators with fans, driven by separate multiple cylinder gas engines.

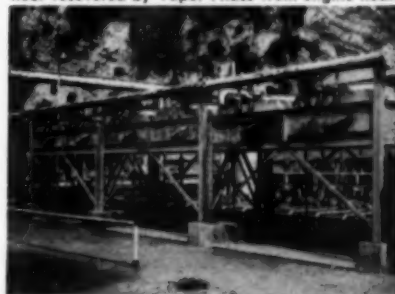
Gas-Fired Oil Heaters were used to separate water and sludge from crude oil. Therefore Tidwater had the cost of additional engines and fuel to cool compressors, plus fuel cost to heat oil.

## AFTER VAPOR PHASE® INSTALLATION

1. Engines are cooled by thermal circulation providing uniform temperature throughout the engine.
2. Separate gas engines to run radiator fans are eliminated.
3. Recovered heat from the engines produced 6750 pounds steam per hour which is fully utilized.
4. Gas-Fired boiler is eliminated.
5. 4,000 pounds of steam per hour heats the crude oil to separate water and sludge from oil.
6. Excess steam is used to heat the workmen's locker room and to drive a steam turbine for the standby condenser-engine cooler.
7. Engine maintenance is reduced.



Crude Oil Treaters operated by 4000# steam per hour recovered by Vapor Phase from engine heat.



Excess steam drives turbine for standby condenser.



**ENGINEERING CONTROLS, Inc.**

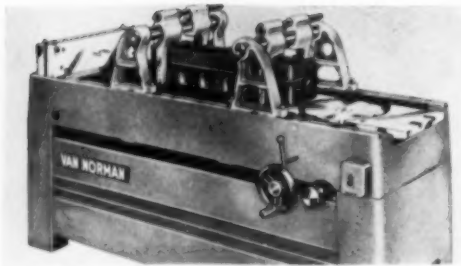
AN AFFILIATE OF ST. LOUIS SHIPBUILDING & STEEL CO.

611 E. Marceau  
St. Louis 11, Mo.

1939 N. Millhurst Ave.  
Los Angeles 27, Calif.

## New Automatic Rotary Broach

A new, fully automatic rotary broach that resurfaces cylinder heads, engine blocks and similar work in three steps has been introduced by the Van Norman Machine Co., a division of Van Norman Industries, Inc. Officials report that resurfacing an average cylinder head to the precision microinch surface required for perfect gasket seal can now be accomplished in less than 10 min. Three steps give maximum operating speed with the new model 570 rotary broach. Work is set up on the loading table, the micrometer up-feed control set for required positive stock removal, and the automatic traverse feed started. The machine automatically shuts off at the end of the traverse.



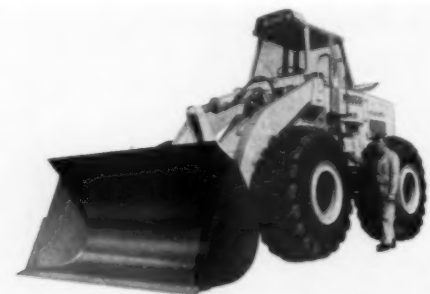
The model 570 requires only 17 sq. ft. of machine space. The new machine features a built-in loading table to permit fast, top-side set-ups directly from machined surface of work. Exact level-line positioning assures accuracy. A special new cutter provides individual, easily replaced, carbide in-

serts which can be sharpened with a special cutter lapping fixture. In addition, a micrometer gauge allows the operator to quickly set inserts to uniform height and concentricity. Two sets of holding fixtures securely hold a variety of work including V8 engine blocks and overhead valve type cylinder heads, also in-line engine blocks and cylinder heads. All controls are grouped together in a single unit for maximum operator convenience. For additional information on the model 570 rotary broach, write to Van Norman Machine Company, Springfield, Mass.

**ITS NEW**

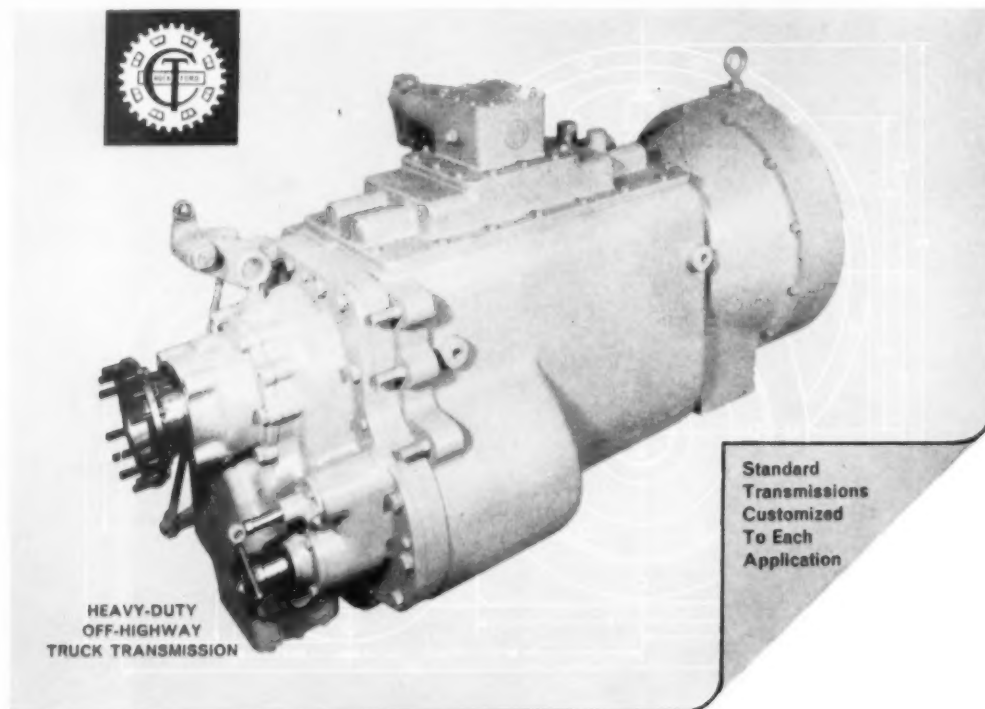
## Hough Announces 300 HP Diesel Loader

The Frank G. Hough Co. recently announced the addition of a new model H-120 to its line of rubber-tired, four-wheel-drive Payloader tractor-shovels. According to the manufacturer, this unit has the highest dumping clearance, the longest reach and the most powerful engine of any tractor-shovel of its size and capacity range. The maximum height of raised bucket is 19 ft. 2½ in. with clearance to center of hinge pin, 14 ft. 7½ in. With the bucket dumped at 50°, clearance under the bucket edge is 10 ft. 10 in., and the forward reach from the front tire is 3 ft. 6 in. This newest Payloader is powered by a turbo-charged Cummins NRT-6-B1 diesel engine which develops 300 hp at 2,100 rpm. Optional engines will be available in the near future. Standard unit is equipped with 26.5 x 25, 14 ply tires. The manufacturer's recommended load carry capacity is conservatively rated at 12,000 lbs. Buckets from 3 to 6 cu. yds. are offered for handling various materials where the total load weight falls within the carry capacity range. For digging operations, the H-120 has a tremendous break out force of 26,000 lbs., and the bucket can be tipped back 40° at ground level.



The H-120 features a four-speed, forward and reverse, power-shift transmission and matched torque-converter which provides travel speeds up to 28 mph. The filtered hydraulic system is closed and pressure-controlled. Both air brakes and power-steering are standard. Dual foot pedals give the operator a choice of braking with transmission engaged or disengaged. Other protective features include the use of Donaldson's Donalocyclonic and filtered air cleaner. The H-120 is equipped with power-transfer differentials. When slippery ground conditions are encountered, additional torque is automatically transferred to the wheels with the best footing. For complete details, dimensions and specifications on this H-120 Payloader write to The Frank G. Hough Co., 913 Seventh St., Libertyville, Ill.

**ITS NEW**



## Solve your heavy-duty power problems with Cotta heavy-duty transmissions

Is full engine power out of reach for your machine because the gearbox can't handle heavy-duty loads? Cotta power transmission specialists can customize standard transmissions to meet your individual heavy machinery requirements: multiple speeds, forward and reverse, space limitations, continuous day-and-night operation, weight, and mounting.

### 150 to 2,500 ft-lb input torque capacities

Cotta takes over where standard transmissions quit . . . in 100 to 750-hp ranges . . . in capacities from 150 to 2,500 ft-lb input torque. For half a century, Cotta "engineered-to-order"

transmissions have been leaders of power to profit on drilling rigs, rock crushers, pumps, power shovels, locomotives, generators, and other equipment demanding long hours of trouble-free operation in the field.

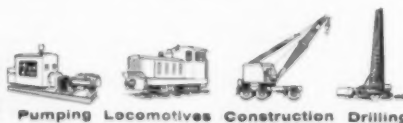
### Diagrams sent free on request

See our catalog No. 3A/Co in Sweet's Product Design File. Check the detailed descriptions and specifications on standard and custom applications. Then call Cotta (TWX-RK-7720 or phone WO 4-5671) for details on precision-built transmissions designed especially to solve your heavy-duty power problem.

# COTTA

**HEAVY-DUTY TRANSMISSIONS**

COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS





## NEW DIESEL HELPS THE MISS ADA NET SHRIMP

**M**ISS *Ada*, a 33 ft. long shrimp trawler out of Vandemere, N.C., reportedly has improved its performance since its gasoline engine was replaced with a diesel last May. Owner C. B. Smith removed the 241 cu. in. gasoline plant in favor of a 3-cylinder, 170 cu. in. Cerlist Model 3M.

The new diesel, manufactured by Cerlist Diesel, Inc., Burlington, N.C., is rated 85 hp at 3000 rpm with 4 in. bore and 4½ in. stroke. The propeller is driven through a 2:1 Paragon SA 102 transmission, which was installed by Hobucken Ways & Machine Shop, Vandemere.

Working off the North Carolina and South Carolina coasts, *Miss Ada* has top speeds of 12 mph when empty and 9 mph with full load (5 tons net). The vessel has an 11-ft. beam and 31-in. draft.

With the new power train, *Miss Ada* on a recent shrimping trip reportedly made four passes to every three of a boat of comparable size working alongside. Periodic maintenance procedures for the *Miss Ada* include change of oil and replacement of oil filters at 100-hr. intervals.

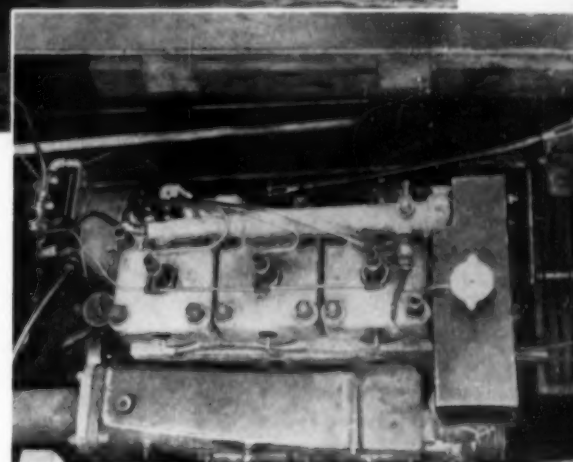


A 33-ft. shrimp trawler, *Miss Ada* has top speed of 9 mph with full load.

*Miss Ada's* 3-cylinder Cerlist diesel, rated 85 hp at 3000 rpm.

### Accessory Equipment on *Miss Ada's* Cerlist Diesel

Starter	Autolite
Governor	Robert Bosch
Transmission	Paragon
Generator	Auto-Lite
Fuel injection pumps	Robert Bosch
Fuel oil filter	Fram



Fuel oil transfer pump	Robert Bosch
Lube oil	Gulf
Lube oil filter	Air-Maze
Cooler	Cerlist
Air intake filter	Cerlist

## PURSE SEINER DIANA

**D**IANA, a seiner whose home port is Monterey, Calif., is consistently one of the top sardine boats on the West Coast. The boat was originally built 25 years ago by Larson Boat Works, San Pedro, Calif., for Pete Maiorana. Mr. Maiorana is well known among the men of the Monterey fleet for the several interesting adaptations he has made to his boat so that he can bring in big catches consistently and quickly.

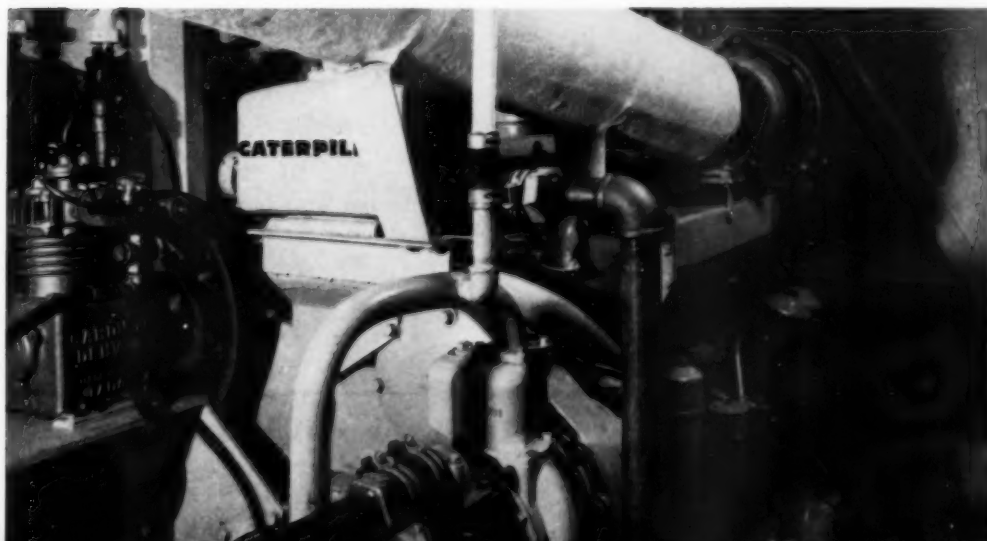
Pete Maiorana invented the "Maiorana purse ring"

which increased the efficiency of raising and closing his net by 30 per cent. Maiorana installed a hydraulically operated power-block arrangement for operating his net, rather than a conventional, cable-controlled block. The traditional old wooden boom was replaced by a steel davit, and to round off these operational improvements, a new 300 hp Caterpillar D353 diesel engine with a Cat 4:1 ratio marine gear was installed. With this new engine, the *Diana* runs free and unloaded at a speed of about 10 knots.

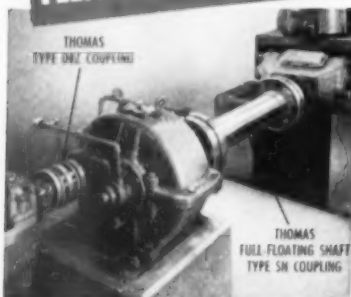
The vessel is most versatile and seaworthy. It is 81 ft. long and has a 24 ft. beam. Its 61 in. 3-blade propeller has a 56 in. pitch. The vessel can carry a maximum load of 160 tons of fish as Capt. Maiorana pilots the seiner back from the fishing grounds off Monterey Bay to the cannery ashore in fast time.

*Diana's* new Caterpillar D353 diesel engine drives her at 10 knots. She operates off the fishing grounds off Monterey (Calif.) Bay.

The *Diana's* new 300 hp D353 Caterpillar diesel engine.



PROTECT Your Machinery  
with  
**THOMAS**  
ALL METAL  
FLEXIBLE COUPLINGS



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**NO MAINTENANCE**  
**NO WEARING PARTS**

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Properly installed and operated within rated conditions, Thomas Flexible Couplings should last a lifetime.

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OFFER ALL THESE ADVANTAGES.**

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Torsional Rigidity
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- 3 Smooth Continuous Drive with  
Constant Rotational Velocity
- 4 Visual Inspection While  
in Operation
- 5 Original Balance for Life
- 6 No Lubrication
- 7 No Wearing Parts
- 8 No Maintenance

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Auxiliary Drives

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WARREN, PENNSYLVANIA, U.S.A.

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# NOW-YOU GET CLEANER ENGINE PARTS, LONGER ENGINE LIFE BECAUSE OF THIS MAJOR ADVANCE IN LUBRICATING OILS **SUPER RPM DELO SPECIAL**



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RPM DELO Oils have been quality leaders in the lubricant field for over 25 years—the most popular dual-purpose engine lubricants ever developed.

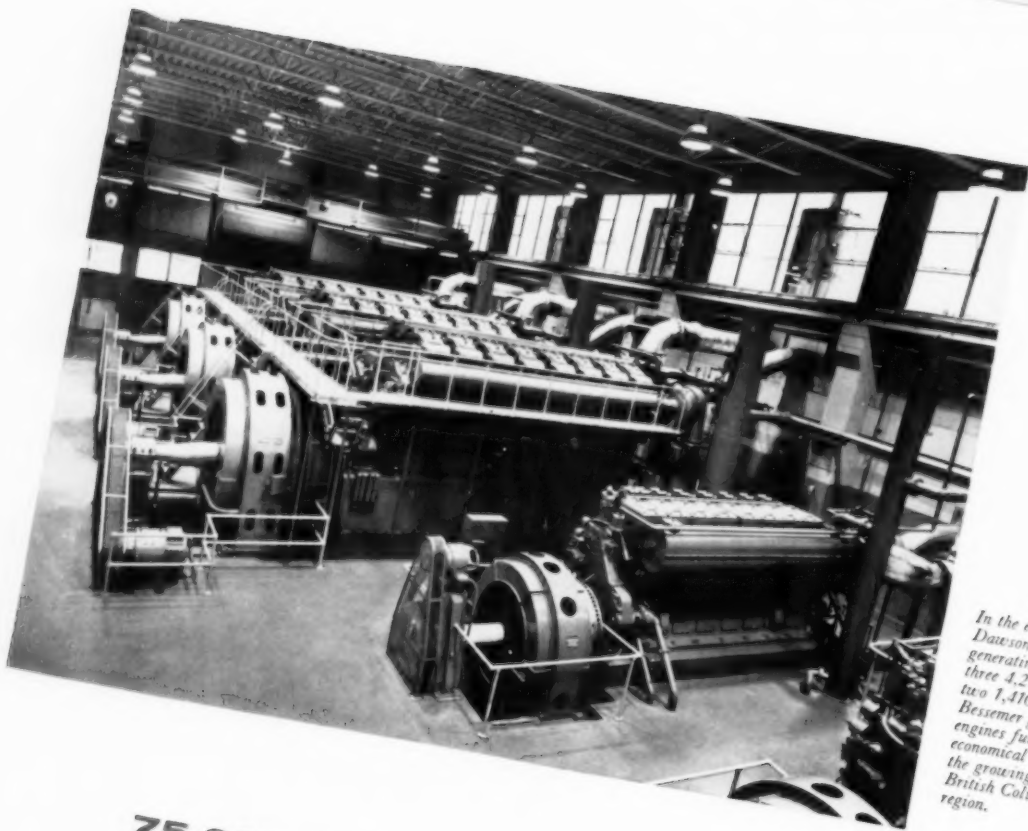
Now, Super RPM DELO Special Lubricating Oil sets a new standard of quality. Developed ahead of diesel engine design, it upgrades performance in your diesel and heavy duty gasoline engines—thoroughly tested in the laboratory and under the most severe field conditions. It is particularly effective for mixed fleet operations.

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*For longer engine life, real engine economy, ask your local representative about Super "RPM DELO" Special, or write any company listed below:*

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*In the expanded Dawson Creek generating station, three 4,210 hp and two 1,410 hp Cooper-Bessemer gas-diesel engines furnish economical energy to the growing central British Columbia region.*

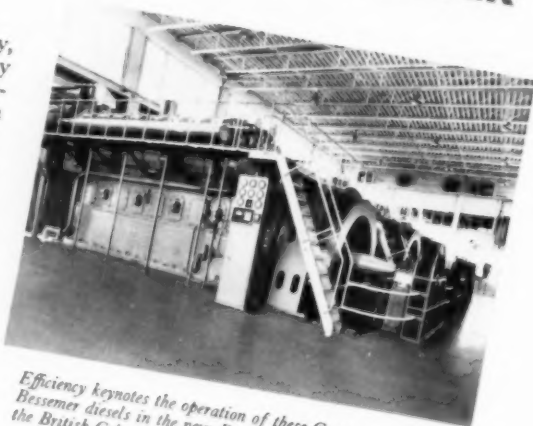
## 75,000 COOPER-BESSEMER HORSEPOWER serve British Columbia

Performance of previously installed units, reliability, fuel economy, service . . . four vital reasons why Dawson Creek is still another Cooper-Bessemer equipped station of the ever-expanding British Columbia Power Commission.

Of more than 75,000 installed Cooper-Bessemer horsepower throughout the B.C. system, the Dawson Creek plant totals 15,450 hp.

To learn more about the efficiencies and economies of this and similar Cooper-Bessemer power installations, write The Cooper-Bessemer Corporation, Mount Vernon, Ohio.

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*Efficiency keynotes the operation of these Cooper-Bessemer diesels in the new Dawson Creek plant of the British Columbia Power Commission.*

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